# KLM308X

# SOP4 ZERO-CROSS TRIAC PHOTOCOUPLER

## SOP4 过零双向可控硅光电耦合器





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# 1. 产品特点 Product features

- 无卤素 (溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Halogens free (Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- 峰值击穿电压 Peak breakdown voltage
  KLM308X: 800V
- 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)
- 过零电压 Zero voltage crossing
- 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:CQC25001468788) CQC approved (No.CQC25001468788)
  VDE认证已批准(编号:40061363) VDE approved (No.40061363)

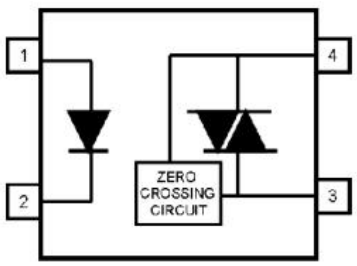
# 2. 产品描述 Product Description

- KLM308X 器件包括一个砷化镓红外发射二极管和一个单晶硅芯片的过零光电双向晶闸管组成，属于零交叉双向可控硅驱动器光耦
  The KLM308X device consists of a GaAs infrared emitting diode and a single crystal silicon chip zero-cross triac transistor. The KLM308X device is a zero-crossing triac photocoupler.
- 它被设计用于与分立功率双向可控硅开关配合使用，将逻辑系统连接到由 110 至 240 VAC 线路供电的设备，如固态继电器、工业控制装置、电机、螺线管和消费电器、高速风筒 等
  It is designed to use with a discrete power triac in the interface of logic systems to equipment powered from 110 to 240 VAC lines, such as solid-state relays, industrial controls, motors, solenoids and consumer appliances, high-speed blower, etc.

# 3. 产品应用 Product Applications

- 电磁阀/阀门控制器 Solenoid/valve controls
- 灯光控制 Light controls
- 静态电源开关 Static power switch
- 交流电机驱动器 AC motor drivers
- 电动机接触器 E.M. contactors
- 温度控制器 Temperature controls
- 交流电机启动器 AC Motor starters
- 高速风筒 High-speed blower

# 4. 功能图 Functional Diagram




引脚配置 Pin Configuration
1. 阳极Anode
2. 阴极Cathode
3. 终端Terminal
4. 终端Terminal

# 5. 光电特性 Electrical-Optical characteristics

• 最大限度额定值(温度=25°C) Absolute Maximum Ratings(Ta=25°C)

| 参数 Parameter | | 符号 Symbol | 额定值 Rated Value | 单位 Unit |
|---|---|---|---|---|
| 输入 Input | 正向电流 Forward current | $I_F$ | 60 | mA |
| | 峰值正向电流 Peak forward current (1us pulse, 300pps) | $I_{F(PK)}$ | 1 | A |
| | 反向电压 Reverse voltage | $V_R$ | 6 | V |
| | 功耗Power dissipation | $P_D$ | 100 | mW |
| 输出 Output | 断态输出端电压 Off-state Output Terminal Voltage | $V_{DRM}$ | 800 | V |
| | 导通有效值电流 On-State RMS Current | $I_{T(RMS)}$ | 70 | mA |
| | 功耗 Power dissipation | Pc | 300 | mW |
| 隔离电压 ( 1* ) Isolation Voltage | | $V_{iso}$ | 3750 | Vrms |
| 工作温度 Operating temperature | | $T_{OPR}$ | -40 to +110 | ℃ |
| 储存温度 Storage temperature | | $T_{STG}$ | -55 to +150 | ℃ |
| 焊接温度 ( 2* ) Soldering temperature | | $T_{SOL}$ | 260 | ℃ |

附注 (Notes):

1* 交流电源1分钟内, 相对湿度在40~60%RH环境下, 隔离电压测试时, 1&2脚短接, 3&4脚短接
AC for 1 minute, R.H.= 40 ~ 60% R.H. 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(Ta=25℃,除非另有规定)

## Electrical Characteristics(Ta=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 | $V_F$ | - | - | 1.5 | V | $I_F$=30mA |
| | 反向电流 Reverse current | $I_R$ | - | - | 10 | μA | $V_R$=6V |
| 输出 Output | 断态峰值电流 Peak Blocking Current | $I_{DRM1}$ | - | - | 100 | nA | $V_{DRM}$ = Rated $V_{DRM}$ $I_F$ = 0mA |
| | 峰值导通电压 Peak On-state Voltage | $V_{TM}$ | - | - | 3 | V | $I_{TM}$=100mA peak |
| | 断态电压临界上升率 Critical Rate of Rise off-state Voltage | dv/dt | 1000 | - | - | V/μs | |
| | 抑制电压（MT1-MT2 电压高于该电压时器件不会触发) Inhibit Voltage (MT1-MT2 voltage above which device will not trigger) | $V_{INH}$ | - | - | 20 | V | $I_F$= Rated $I_{FT}$ |
| | 抑制状态下的漏电流 Leakage Current in Inhibited State | $I_{DRM2}$ | - | - | 1000 | μA | $I_F$= Rated $I_{FT}$, $V_{DRM}$=Rated $V_{DRM}$, off state |

• 附注(Notes):

Ta=25℃时的规格值 Typical values at Ta = 25°C

• 传输特性 (Ta=25℃, 除非另有规定)
Transfer Characteristics (Ta=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 |
|---|---|---|---|---|---|---|---|
| LED触发电流 LED Trigger Current | KLM3082 | $I_{FT}$ | - | - | 10 | mA | 主端子电压=3V Main terminal Voltage=3V * |
| | KLM3083 | | - | - | 5 | | |
| | KLM3084 | | - | - | 3 | | |
| 保持电流 Holding Current | | $I_H$ | - | 280 | - | μA | |

附注(Notes):

* 所有器件都保证在小于或等于最大$I_{FT}$的$I_F$值触发. 因此，建议操作$I_F$在最大$I_{FT}$(KLM3082 10mA、KLM3083 5mA、KLM3084 3mA)和绝对最大$I_F$(60mA)之间
All devices are guaranteed to trigger at an $I_F$ value less than or equal to max $I_{FT}$. Therefore, Recommended operating $I_F$ lies between max $I_{FT}$ (10 mA for KLM3082, 5 mA for KLM3083, 3 mA for KLM3084) and absolute maximum $I_F$(60 mA).

# 7. 特性曲线 Characteristic Curves

图1. 正向电流与正向电压的关系

Figure 1. Forward Current vs Forward Voltage

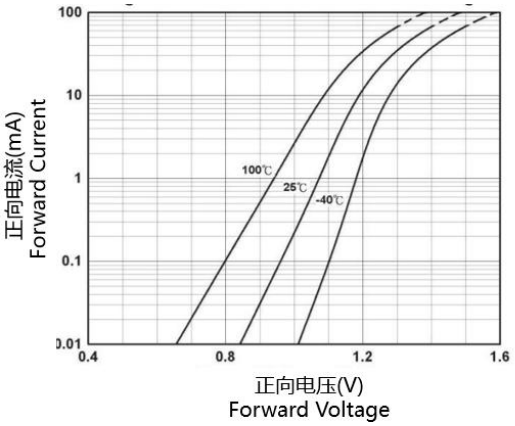



图2. 导通特性

Figure 2. On-State Characteristics

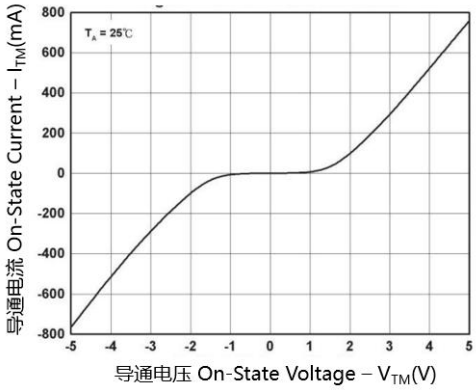



图3. 保持电流 vs 环境温度的关系

Figure 3. Normalized Holding Current vs Ambient Temperature

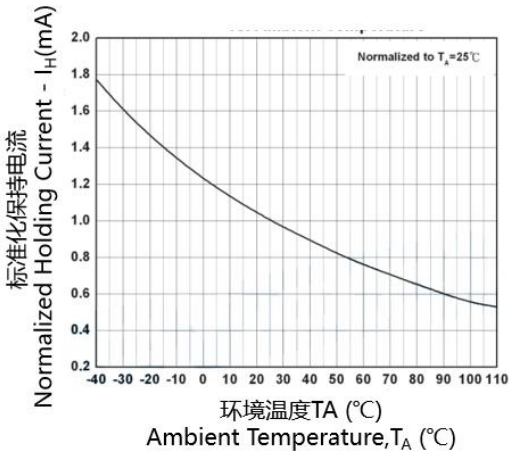



图4. 触发所需LED电流 vs LED脉冲宽度的关系

Figure 4. LED Current Required to Trigger vs LED Pulse Width

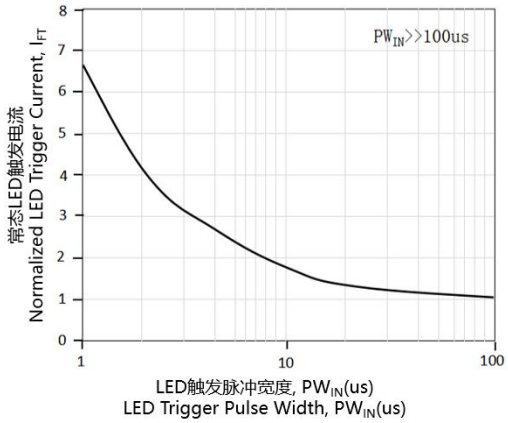



图5. 漏电流 vs 环境温度的关系

Figure 5. Leakage Current vs Ambient Temperature

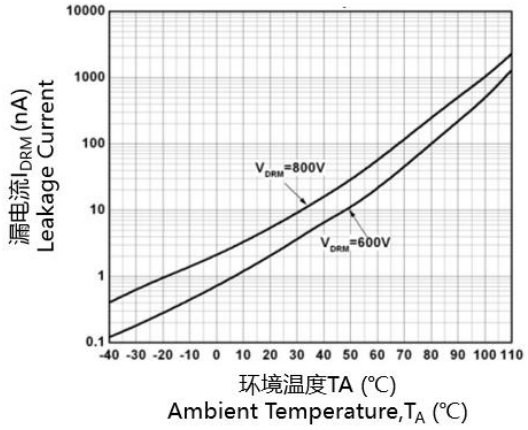



图6. LED触发电流 vs 环境温度的关系

Figure 6. LED Trigger Current vs Ambient Temperature

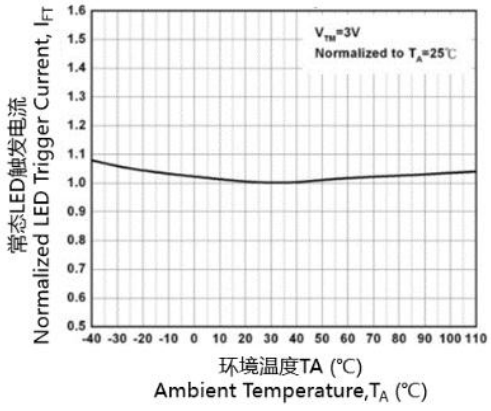


图7.关闭状态输出端电压 vs 环境温度的关系

Figure 7. Off-State Output Terminal Voltage vs Ambient Temperature

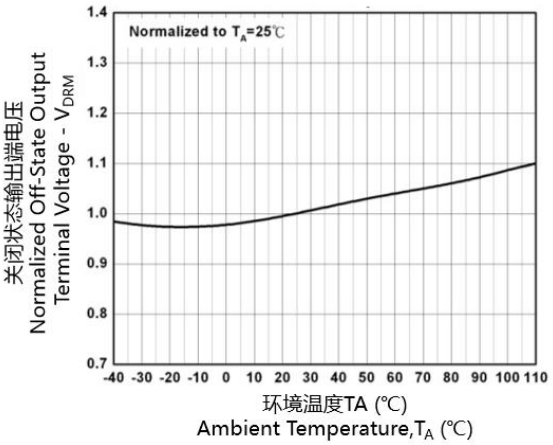



图8. 抑制状态下的漏电流 vs 环境温度的关系

Figure 8. Leakage Current in Inhibit State vs Ambient Temperature

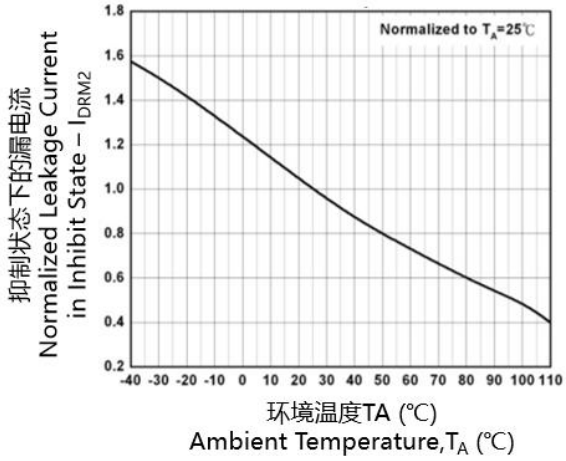



图9. 抑制电压 vs 环境温度的关系

Figure 9. Inhibit Voltage vs Ambient Temperature

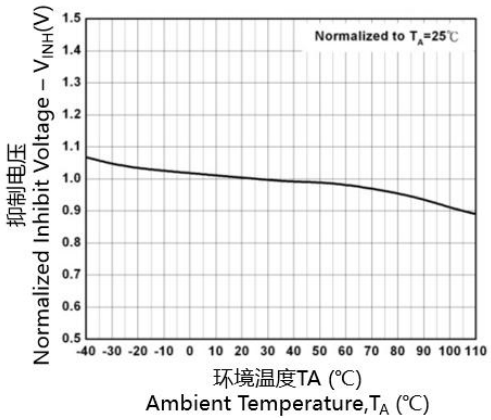
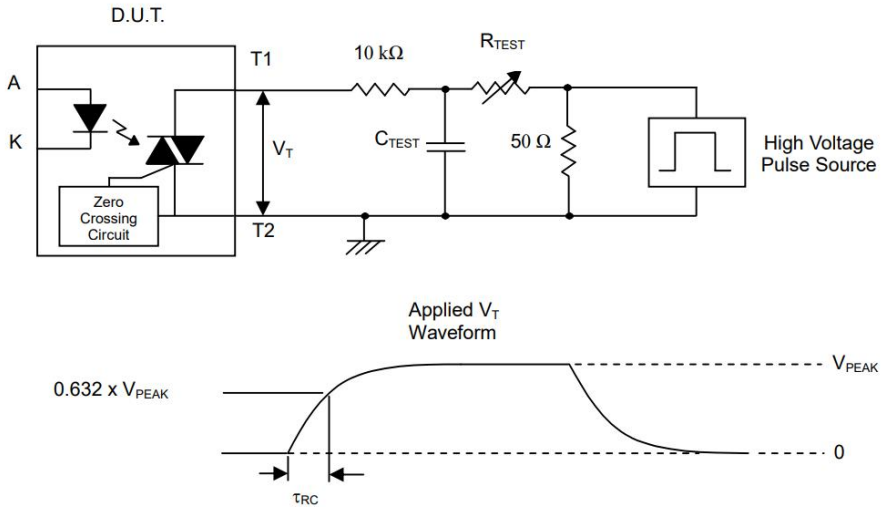


图10.静态dv/dt测试电流和波形 Static dv/dt Test Circuit & Waveform




测量方法 Measurement Method

高压脉冲设置为所需的$V_{PEAK}$值, 并通过上述RC电路应用于D.U.T输出值，不应用LED电流,使用X100范围探头监视波形$V_T$, 通过改变$R_{TEST}$, dv/dt(斜率)增加, 直到DU被观察到触发(波形崩溃)。dv/dt随后下降,直到D.U.T.停止触发, 此时记录 $\tau_{RC}$, 计算$dv/dt=0.632*V_{PEAK}/\tau_{RC}$

The high voltage pulse is set to the required $V_{PEAK}$ value and applied to the D.U.T. output side through the RC circuit above. LED current is not applied. The waveform $V_T$ is monitored using a x100 scope probe. By varying $R_{TEST}$, the dv/dt (slope) is increased, until the D.U.T. is observed to trigger (waveform collapses). The dv/dt is then decreased until the D.U.T. stops triggering. At this point, $\tau_{RC}$ is recorded and the dv/dt calculated. $dv/dt=0.632*V_{PEAK}/\tau_{RC}$

例如, KLM308X系列的$V_{PEAK}$=800V, dv/dt值的计算公式如下:

For example, $V_{PEAK}$ = 800V for KLM308X series. The dv/dt value is calculated as follows:

$dv/dt= 0.632*800/\tau_{RC}$

# 8. 订单信息 Order Information

• 材料编号 Part Number

## KLM308X-Z-V

**附注(Notes):**

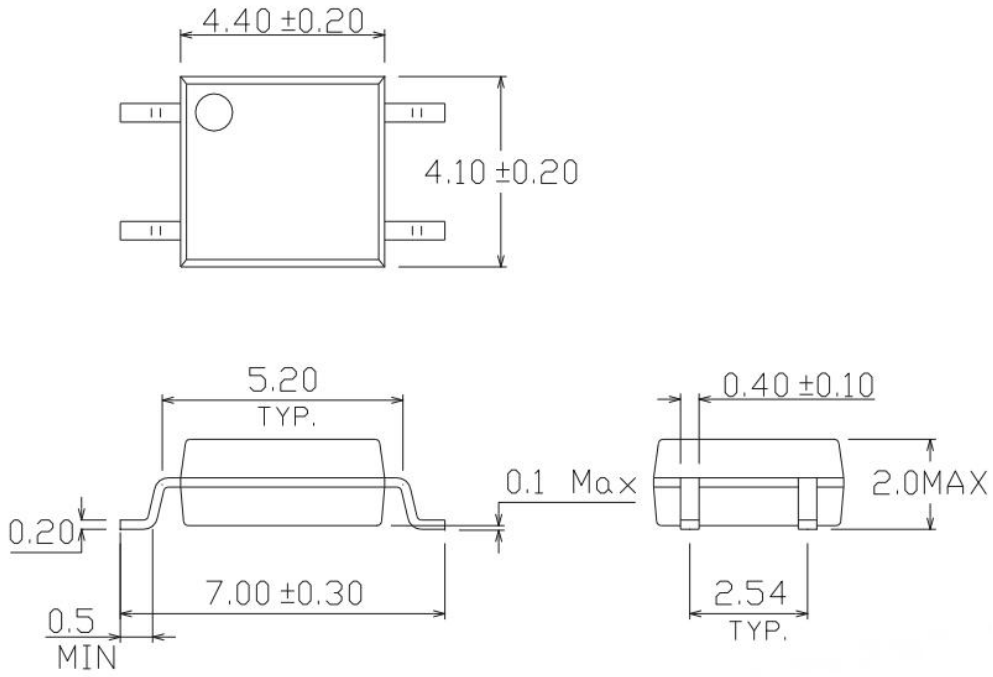
X = 零件编号(2、3 或 4) Part No. (2 , 3 or 4)

Z = 料带和卷轴选项(TA、TB 或 无)
Tape and reel option (TA, TB or None)

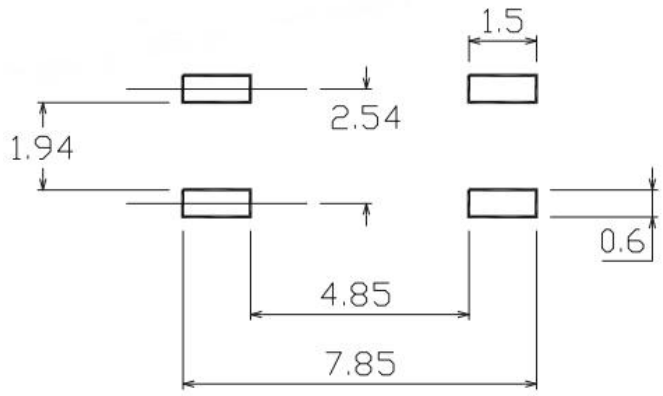
V = 表示VDE标识(客户指定镭射字符才加"V")
VDE (Only add "V" to laser characters specified by the customer)

| 选项<br>Option | 描述<br>Description | 包装数量<br>Packing quantity |
|---|---|---|
| TA | TA载带和卷轴选项<br>TA Tape & reel option | 每卷3000pcs<br>3000 units per reel |
| TB | TB载带和卷轴选项<br>TB Tape & reel option | 每卷3000pcs<br>3000 units per reel |
| TA-V | TA载带和卷轴选项 + VDE<br>TA Tape & reel option + VDE optional | 每卷3000pcs<br>3000 units per reel |
| TB-V | TB载带和卷轴选项 + VDE<br>TB Tape & reel option + VDE optional | 每卷3000pcs<br>3000 units per reel |
| / | 内盒装：每盒3盘<br>Inner box packaging：3reels/box | 每盒9000pcs<br>9000pcs per box |
| / | 每箱装：10个内盒<br>Pack per Carton: 10inner boxes | 每箱90000pcs<br>90000pcs per Carton |

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




• 表面贴片类型PIN脚焊盘布局 Surface patch type PIN foot pad layout




备注 Notes

a. 建议焊盘尺寸仅供参考Suggested pad dimension is just for reference only

b.请根据个人需要修改焊盘尺寸Please modify the pad dimension based on individual needs

## 10. 设备标记 Device marking







(范本参考 Template reference)

**附注(Notes):**

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

M308X = 表示材料部件号 Denotes Device Part Number
X表示零件编号(2、3 或 4) Part No. (2, 3 or 4)

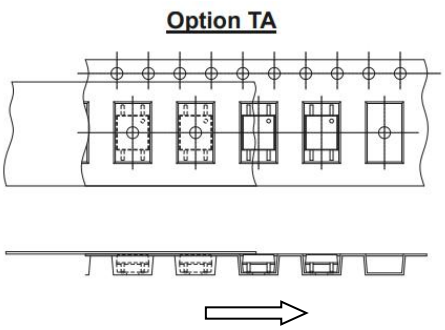
Y = 表示1位年份代码Denotes 1 digit Year code

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)

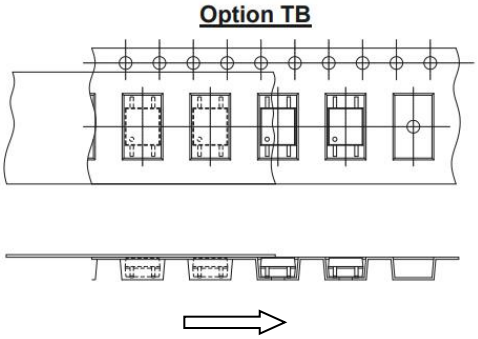
# 11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



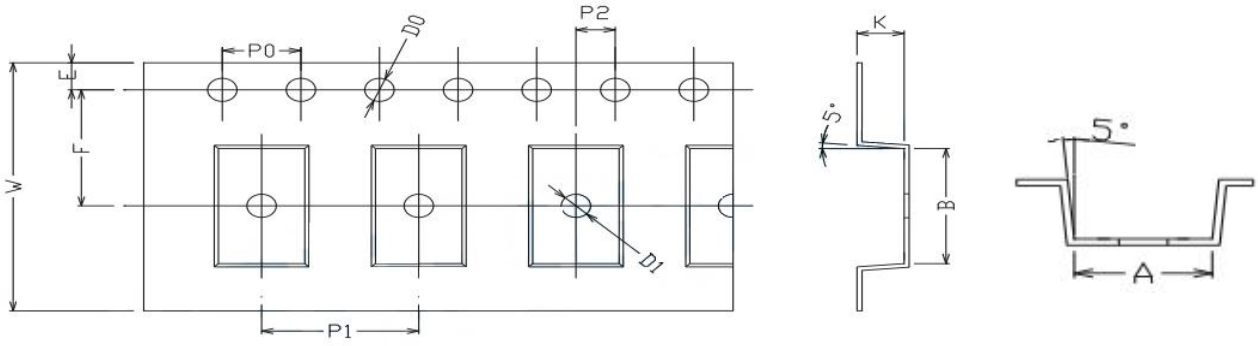

卷轴进给方向 Direction of feed from reel

• 选择TB Option TB




卷轴进给方向 Direction of feed from reel

## 料带尺寸Material belt size



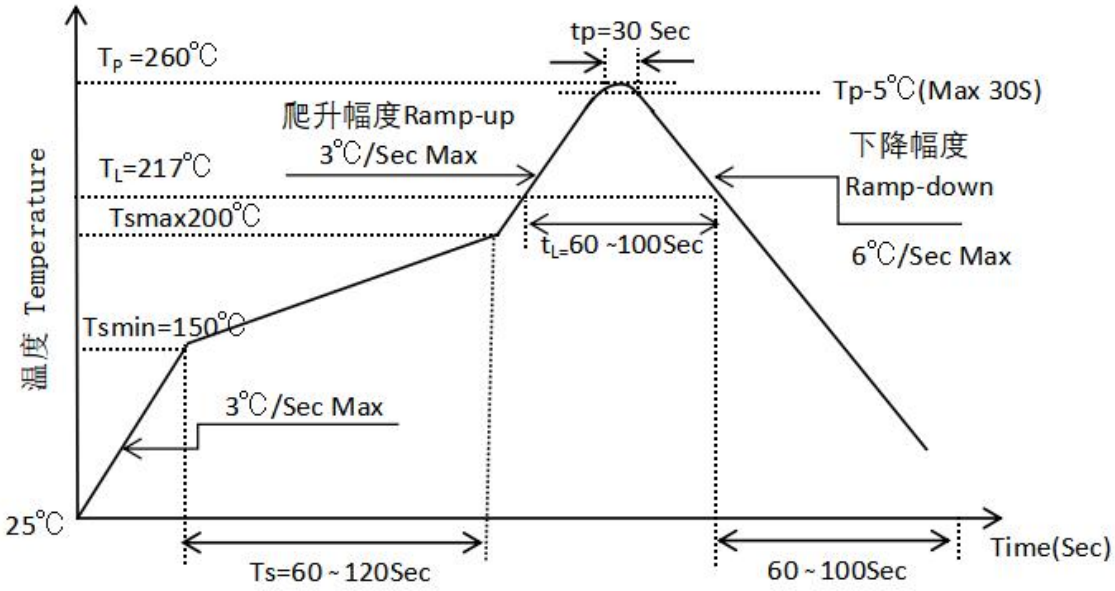

| 尺寸编号 Dimension No. | A | B | D0 | D1 | E | F |
|---|---|---|---|---|---|---|
| 尺寸(mm) Dimension(mm) | 4.4±0.1 | 7.4±0.1 | 1.5+0.1/-0 | 1.5±0.1 | 1.75±0.1 | 7.5±0.1 |
| 尺寸编号 Dimension No. | P0 | P1 | P2 | t | W | K |
| 尺寸(mm) Dimension(mm) | 4.0±0.15 | 8.0±0.1 | 2.0±0.1 | 0.25±0.03 | 16.0±0.2 | 2.4±0.1 |

# 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 | ts | 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 |