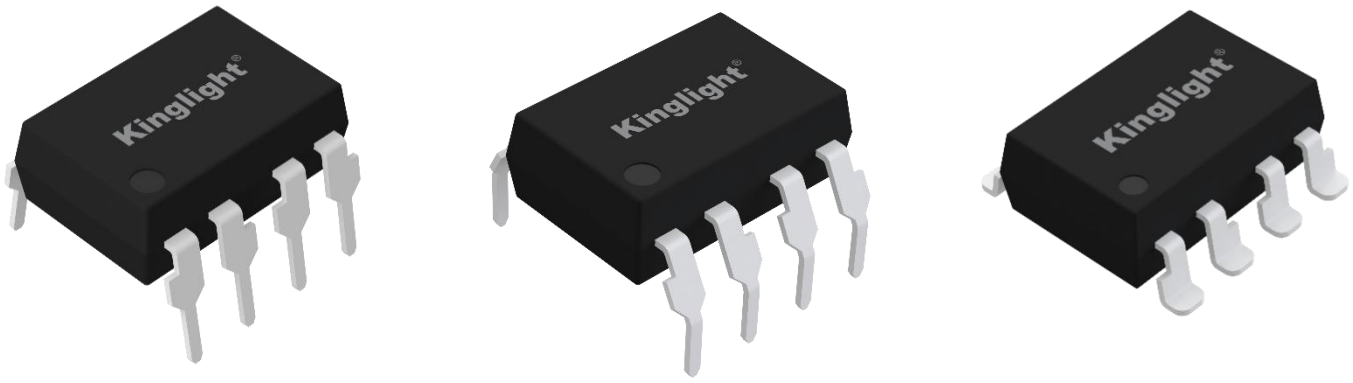
# KLRX213

# ZERO-CROSS PHOTO POWER TRIAC PHOTOCOUPLER

## DIP7 零交叉光电三端双向可控硅光电耦合器





* 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.
* 本文档中提到的产品型号和规格如有更改或改进，恕不另行通知。在生产使用之前，客户应参考产品规格书的最新数据表。
  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.
* 在使用本文档中引用的产品时，请确保产品在数据手册中规定的环境和电气限制范围内运行。如果客户使用超过指定的限制，晶台微电子将不会对任何后续问题负责。
  When using the products referenced in this document, ensure that the products are operated within the environmental and electrical limits specified in the data sheet. If the customer uses the product beyond the specified limits, Kinglight Microelectronics will not be responsible for any subsequent problems.
* 本文档中的信息适用于电子元器件应用中的典型用法。如有任何特殊用途，请向晶台微电子咨询，以获得进一步的帮助。
  The information in this document applies to typical use in electronic component applications. For special applications, please contact Kinglight Microelectronics for further assistance.
* 未经晶台微电子允许，不得复制或转载本文件的内容和信息。对于最新的信息，请参考官方网站 Http://www.klmicro.com。
  The contents and information in this document may not be copied or reproduced without the permission of Kinglight Microelectronics. For the latest information, please visit the official website Http://www.klmicro.com.

## 1. 产品特点 Product features

- 低触发电流 $I_{FT}$ 10mA Low trigger current $I_{FT}$ 10 mA
- 断态峰值电压600V Peak off state voltage 600V
- 负载电流(0.3，0.6，0.9，1.2A) Load current (0.3，0.6，0.9，1.2A)
- 工作温度范围-40°C至85°C Wide operating temperature range of -40°C to 85°C
- 输入与输出间高隔离电压(Viso=5000 V rms)
  High isolation voltage between input and output (Viso=5000 V rms)
- 零电压交叉 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:CQC25001468792) CQC approved (No.CQC25001468792)
  VDE认证已批准(编号:40061363) VDE approved (No.40061363)

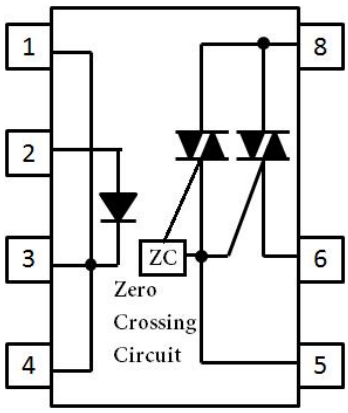
## 2. 产品描述 Product Description

- KLRX213系列器件由一个砷化镓红外发射二极管和一个单片硅零交叉光电三端双向可控硅以及一个主输出三端双向可控硅组成。它们设计用于连接电子控制器和负载，以控制115至240V AC感应操作。
  The KLRX213 series of devices are consist of a GaAs infrared emitting diode optically coupled to a monolithic silicon zero cross photo triac and a main output triac. They are designed for interfacing between electronic controls and loads to control inductive for 115 to 240 VAC operations.
- 它们采用8引脚DIP封装，也可选择表面贴装 SMD 选项
  They are packaged in 8pin DIP package and available in surface mount SMD option

## 3. 产品应用 Product Applications

- 家用电器、工业设备 Home appliances, Industrial equipment
- 开关电机、风扇、加热器、电磁阀和阀门 Switching motors, fans, heaters, solenoids and valves
- 电源控制，如控制照明和控制温度 Power control such as lighting and temperature control

## 4. 功能图 Functional Diagram




引脚配置 Pin Configuration
1. 3. 4 阴极 Cathode
2. 阳极 Anode
5. 三端双向可控硅开关 Triac Gate
6. 三端双向开关T1 Triac T1
8. 三端双向开关T2 Triac T2

## 5. 光电特性 Electrical-Optical characteristics

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

| 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 |
| | 反向电压 Reverse voltage | | $V_R$ | 6 | V |
| | 峰值正向电流(1*) Peak Forward Current | | $I_{FP}$ | 1 | A |
| 输出 Output | 断态峰值电压(2*) Repetitive Peak Off-state Voltage | | $V_{DRM}$ | 600 | V |
| | 导通有效值电流 On-State RMS Current | KLR0213 | $I_{T(RMS)}$ | 0.3 | A |
| | | KLR1213 | | 0.6 | |
| | | KLR2213 | | 0.9 | |
| | | KLR3213 | | 1.2 | |
| | 不重复浪涌电流(3*) Non-repetitive Surge Current | KLR0213 | $I_{TSM}$ | 3 | A |
| | | KLR1213 | | 6 | |
| | | KLR2213 | | 9 | |
| | | KLR3213 | | 12 | |
| 隔离电压 (4* ) Isolation Voltage | | | $V_{iso}$ | 5000 | Vrms |
| 工作温度 Operating temperature | | | $T_{OPR}$ | -40 to +85 | ℃ |
| 储存温度 Storage temperature | | | $T_{STG}$ | -40 to +125 | ℃ |
| 焊接温度 ( 5* ) Soldering temperature | | | $T_{SOL}$ | 260 | ℃ |

附注 (Notes):

1* f=100Hz，占空比=0.1%  f =100Hz, Duty Cycle = 0.1%

2* 正弦波，50至60Hz，$I_{FT}$=0mA  Sine wave, 50 to 60Hz, $I_{FT}$=0mA

3* f=60Hz，一个周期  f=60Hz, one cycle

4*  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&2,3,4脚短接在一起, 5&6,8脚短接在一起
AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1, 2&3, 4 are shorted together, and pins 5 & 6, 8 are shorted together.

5* 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 | $V_F$ | - | 1.2 | 1.4 | V | $I_F$=20mA |
| | 反向电流 Reverse current | $I_R$ | - | - | 10 | μA | $V_R$=6V |
| 输出 Output | 断态重复峰值电流 Repetitive Peak Off-state Current | $I_{DRM}$ | - | - | 100 | μA | $V_{DRM}$=600V $I_F$=0mA |
| | 导通电压 On-state Voltage | $V_{TM}$ | - | - | 2.5 | V | $I_{TM}$=MAX $I_F$=10mA |
| | 断态电压临界上升率 Critical Rate of Rise off-state Voltage | dv/dt | 200 | - | - | V/μs | $V_{DRM}$=600V×1/√2 |
| | 保持电流 Holding Current | $I_H$ | - | - | 25 | mA | - |
| | 抑制电压(MT1-MT2电压,高于该电压器件将不触发) Inhibit Voltage (MT1-MT2 voltage above which device will not trigger) | $V_{INH}$ | - | - | 50 | V | $I_F$=Rated $I_{FT}$ |
| 转移特征 Transfer Characteristics | 最小触发电流 Minimum Trigger Current | $I_{FT}$ | - | - | 10 | mA | $V_D$=6V $R_L$=100Ω |
| | 导通时间 Turn On Time | $T_{on}$ | - | - | 10 | μs | $I_F$ =20mA $V_D$=6V $R_L$=100Ω, |
| | 隔离电阻 Isolation Resistance | $R_{I-O}$ | - | $5\times10^{11}$ | - | Ω, | $V_{I-O}$=500V DC 40 to 60%RH |

• 附注(Notes):

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

# 7. 特性曲线 Characteristic Curves

图1.导通电流与环境温度的关系

Figure 1.On-state Current vs Ambient Temperature

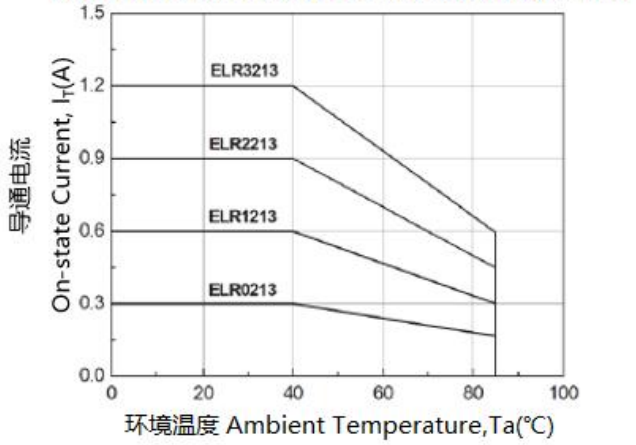



图2.导通电压与环境温度的关系

Figure 2. On-state Voitage vs Ambient Temperature

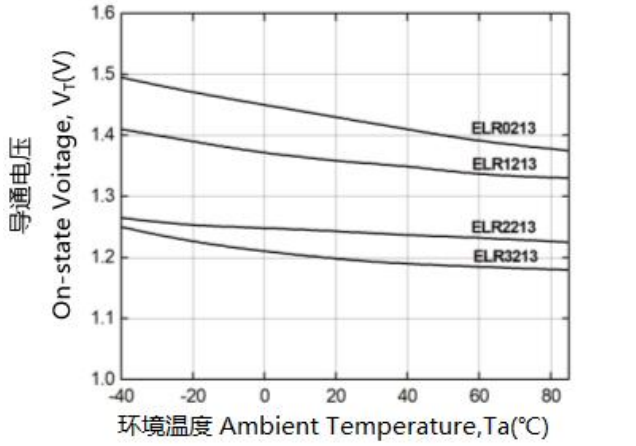



图3.LED触发电流与环境温度的关系

Figure 3. Trigger LED Current vs Ambient Temperature

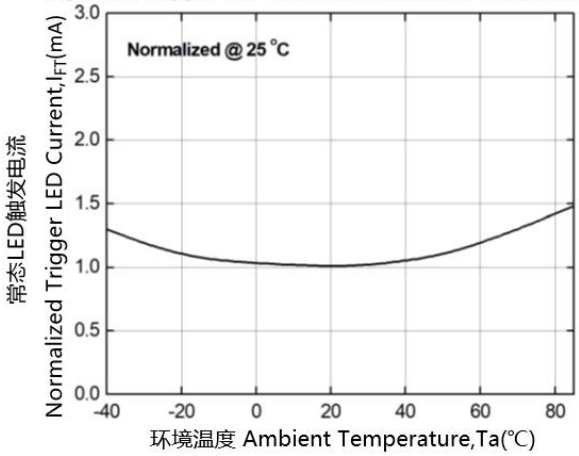



图4.LED截止电压与环境温度的关系

Figure 4. LED Dropout Voltage vs Ambient Temperature

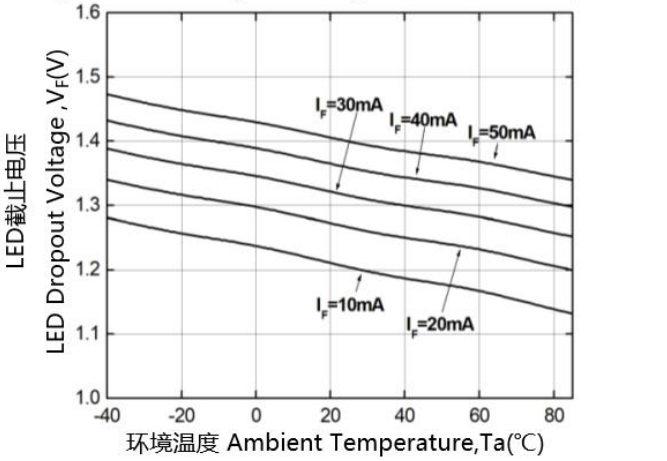



图5.LED导通时间与LED电流的关系

Figure 5. Turn On Time vs LED Current

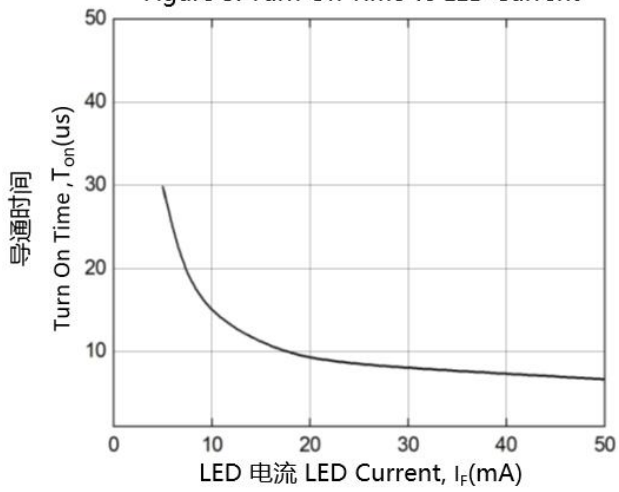



图6.断态漏电流与负载电压的关系

Figure 6. Off-state Leakage Current vs Load Voltage

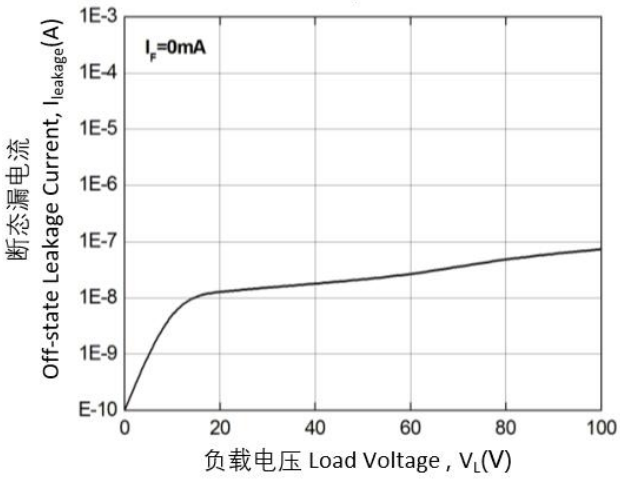


图7.保持电流与环境温度的关系

Figure 7. Holding Current vs Ambient Temperature

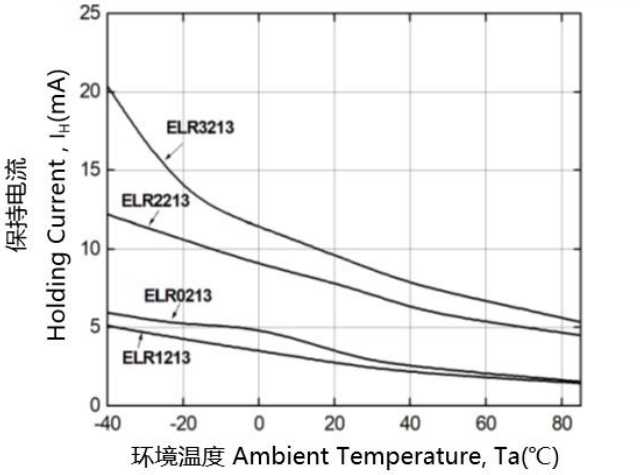
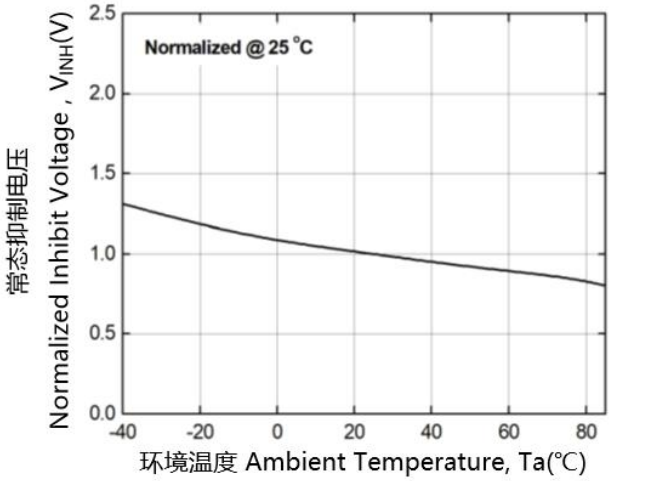



图8.抑制电压与环境温度的关系

Figure 8. Inhibit Voltage vs Ambient Temperature



## 8. 订单信息 Order Information

• 材料编号 Part Number

# KLRX213Y-Z-V

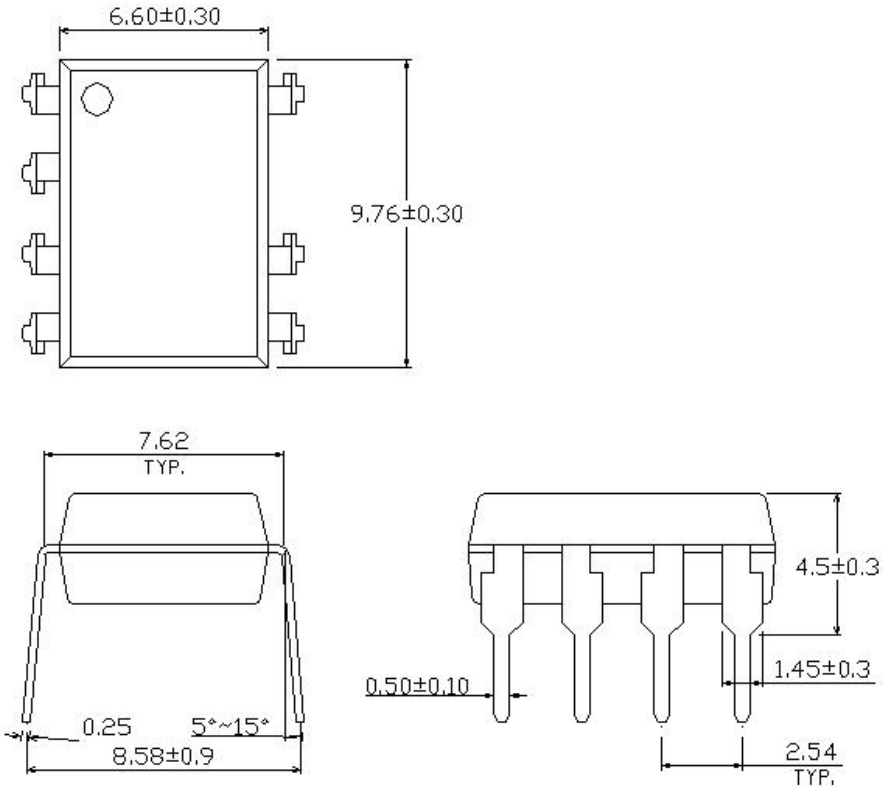
**附注(Notes):**

X = 零件编号(0、1、2或3)
Part No. (0, 1, 2 or 3)
Y = 引脚形式选项(S、S1、M或无)
Lead form option (S, S1, M or none)
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)

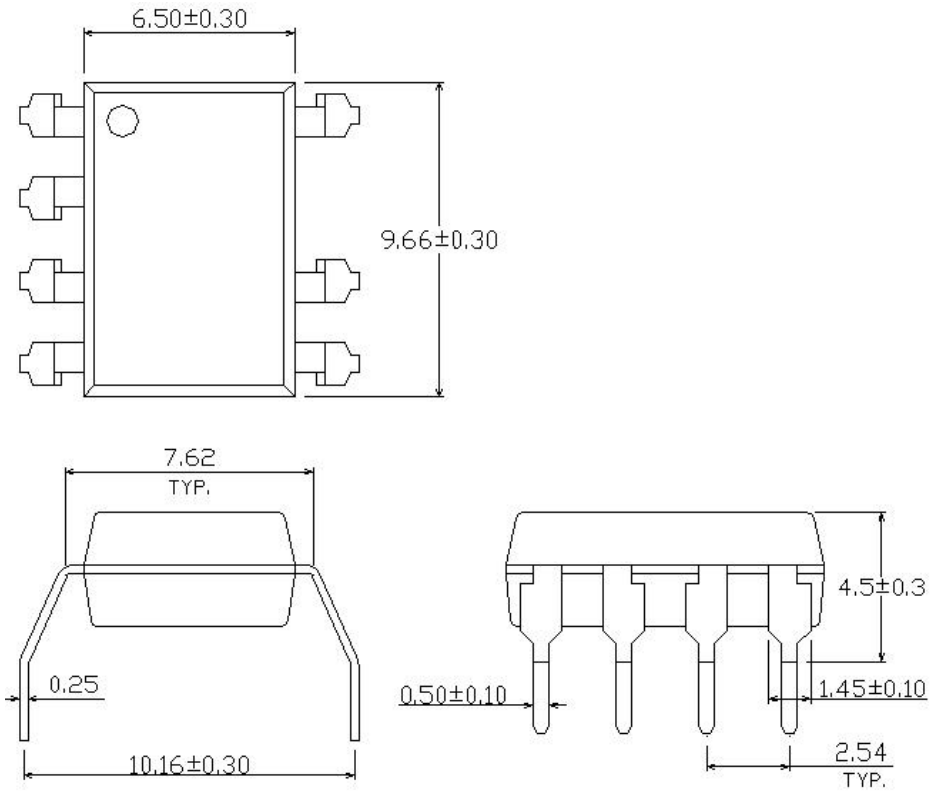
| 选项<br>Option | 描述<br>Description | 包装数量<br>Packing quantity |
|---|---|---|
| 无<br>None | 标准DIP-8<br>Standard DIP-8 | 每管45pcs<br>45 units per tube |
| M | 宽引脚弯曲(0.4英寸间距)<br>Wide lead bend (0.4 inch spacing) | 每管45pcs<br>45 units per tube |
| S-TA | 表面贴装引线形式+TA载带和卷轴选项<br>Surface mount lead form + TA tape & reel option | 每卷1000pcs<br>1000 units per reel |
| S-TB | 表面贴装引线形式+TB载带和卷轴选项<br>Surface mount lead form + TB tape & reel option | 每卷1000pcs<br>1000 units per reel |
| S1-TA | 表面贴装引线形式(低剖面)+TA载带和卷轴选项<br>Surface mount lead form (low profile) + TA tape & reel option | 每卷1000pcs<br>1000 units per reel |
| S1-TB | 表面贴装引线形式(低剖面)+TB载带和卷轴选项<br>Surface mount lead form (low profile) + TB tape & reel option | 每卷1000pcs<br>1000 units per reel |

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

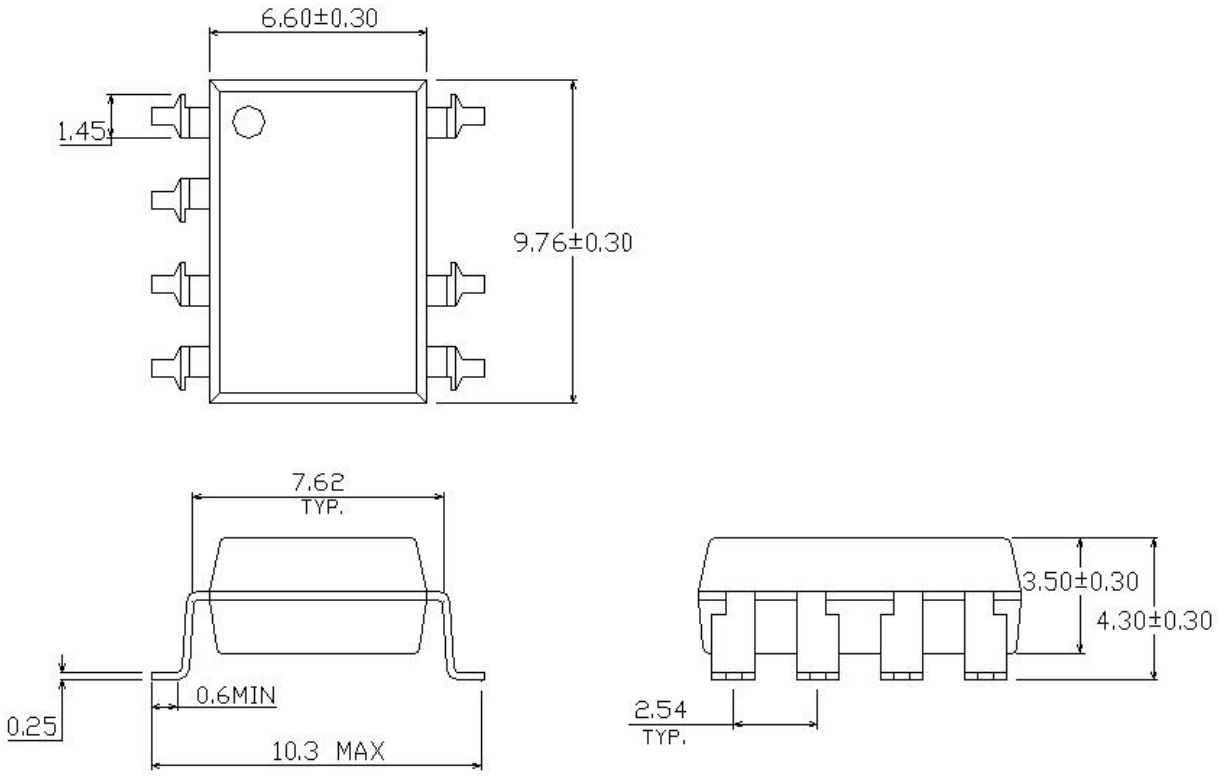
• 标准DIP型号 Standard DIP Type



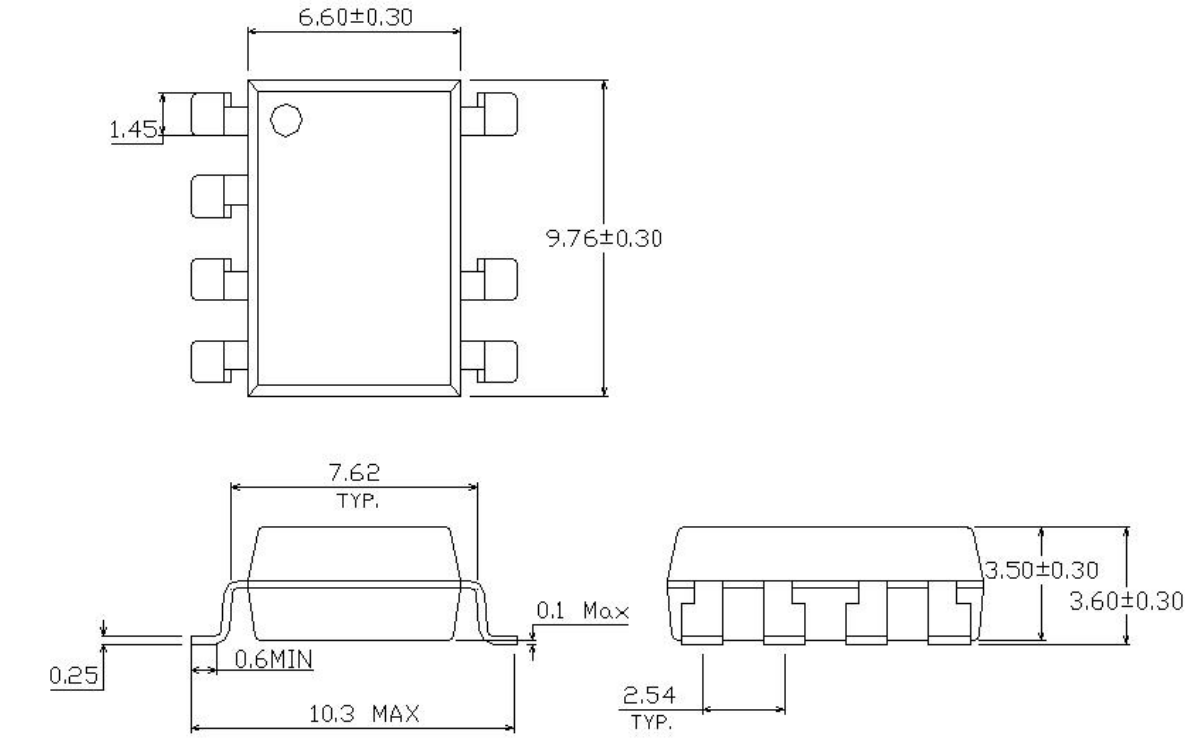

• 选择M型号 Option M Type



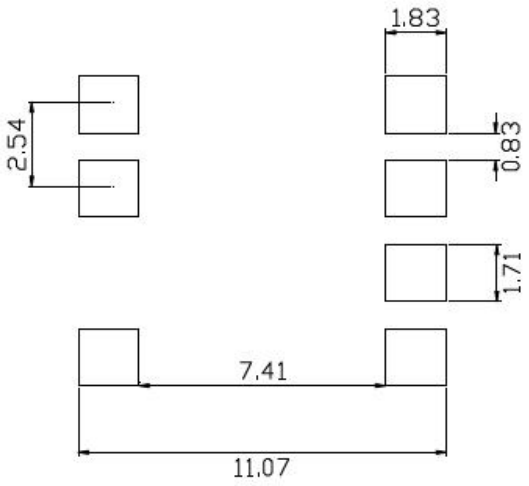
• 选择S型号 Option S Type




• 选择S1型号 Option S1 Type



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

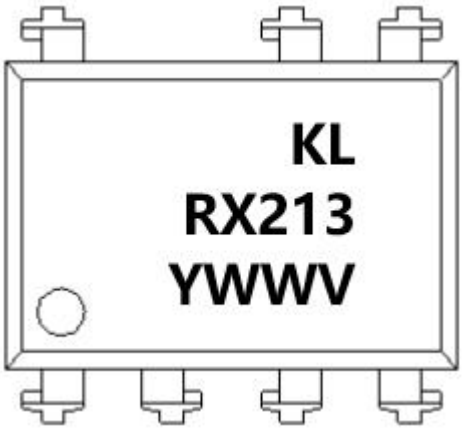


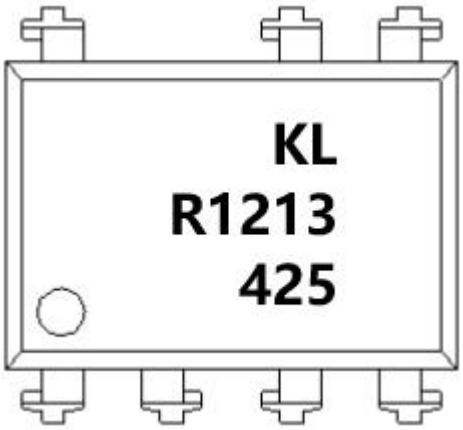

附注(Notes):

a. 推荐焊盘尺寸仅供参考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

RX213 = 表示材料部件号 Denotes Device Part Number
X表示零件编号(0、1、2或3) Part No. (0, 1, 2 or 3)

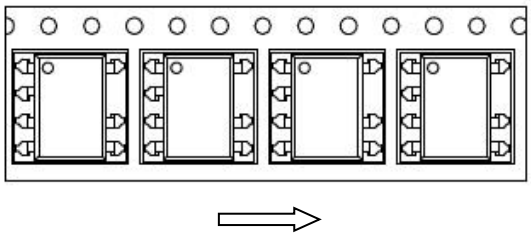
Y = 表示1位年份代码 Denotes 1 digit Year code

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)

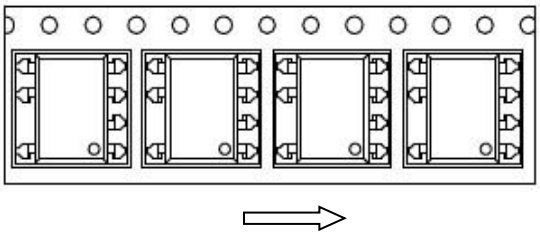
# 11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



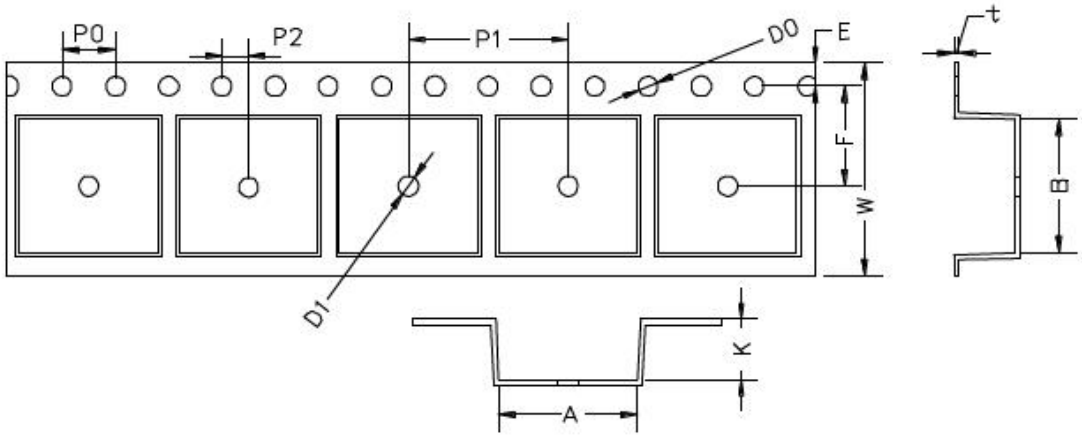
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

## 料带尺寸Material belt size



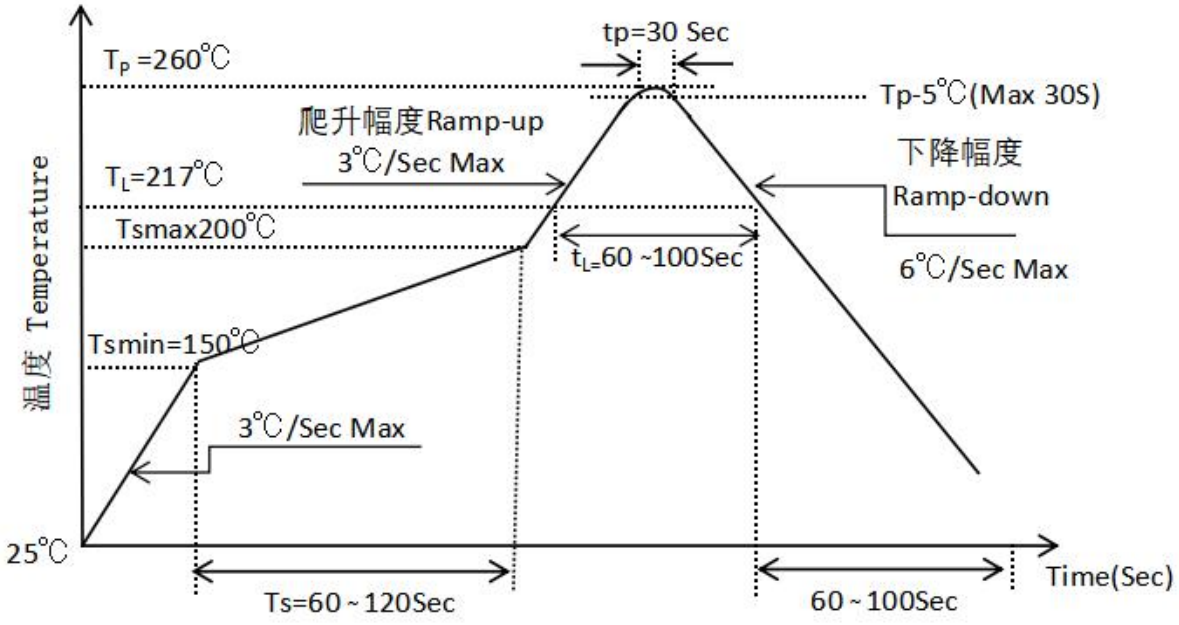

| 尺寸编号 Dimension No. | A | B | D0 | D1 | E | F |
|---|---|---|---|---|---|---|
| 尺寸(mm) Dimension(mm) | 10.4±0.1 | 10.0±0.1 | 1.5+0.1/-0 | 1.5+0.25/-0 | 1.75±0.1 | 7.5±0.1 |
| 尺寸编号 Dimension No. | P0 | P1 | P2 | t | W | K |
| 尺寸(mm) Dimension(mm) | 4.0±0.1 | 12.0±0.1 | 2.0±0.05 | 0.4±0.05 | 16.0±0.3 | 4.5±0.1 |

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

## • 回流焊焊接条件 Reflow soldering Soldering Condition

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.

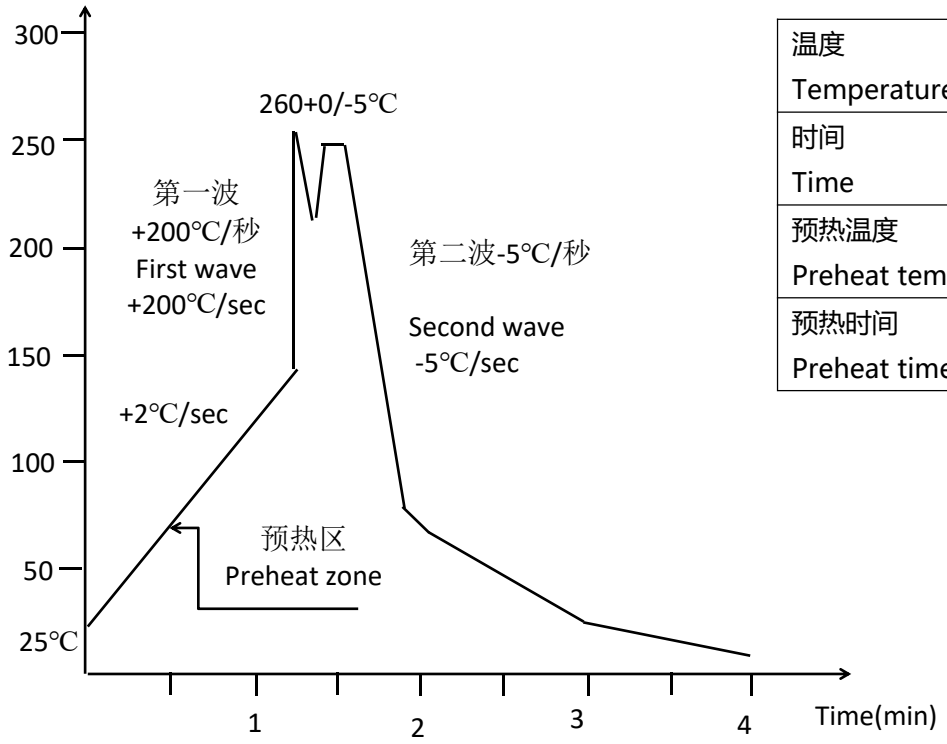



| 项目<br>Item | 符号<br>Symbol | 最小值<br>Min. | 最大值<br>Max. | 单位<br>Unit |
|---|---|---|---|---|
| 预热温度<br>Preheat Temperature | $T_s$ | 150 | 200 | ℃ |
| 预热时间<br>Preheat Time | ts | 60 | 120 | s |
| 升温速率<br>Ramp-Up Rate ($T_L$ to $T_P$) | - | - | 3 | ℃/s |
| 液相线温度<br>Liquidus Temperature | $T_L$ | 217 | | ℃ |
| 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 |

## • 波峰焊温度曲线 Wave Soldering

温度条件下, 建议一次焊接

One time soldering is recommended within the condition of temperature




| | |
|---|---|
| 温度<br>Temperature | 260℃+0/-5℃ |
| 时间<br>Time | 10秒<br>10S |
| 预热温度<br>Preheat temperature | 25至140℃<br>25 to 140℃ |
| 预热时间<br>Preheat time | 30至80秒<br>30 to 80 S |