Kinglight®
晶台微电子

KL851

HIGH VOLTAGE PHOTO TRANSISTOR

DIP4 高压晶体管光耦



＊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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1. 产品特点 Product features

- 电流转换率(Current transfer ratio)
  (CTR: 50~600% at I_F = 5mA, V_{CE} = 5V)
- 集电极-发射极高电压(V_{CE} Min350V)
  High collector- emitter voltage (V_{CE} Min350V)
- 输入与输出高隔离电压(Viso=5000 V rms)
  High isolation voltage between inputs and output (Viso=5000 V rms)
- 紧凑的双列式封装 Compact dual-in-line package
- 产品本身将保持在符合RoHS的版本范围内
  The product itself will remain within RoHS compliant version
- 符合欧盟REACH法规 Compliance with EU REACH
- 合规无卤素（仅限铜引线框）(溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Compliance Halogens Free (Only copper lead frame) (Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- 安全审批 Safety approval
  CQC认证已批准(编号:CQC23001407997) CQC approved (No.CQC23001407997)
  UL认证已批准(编号:UL-CA-2340753-0) UL approved (No. UL-CA-2340753-0)
  VDE认证已批准(编号:40059021) VDE approved (No.40059021)

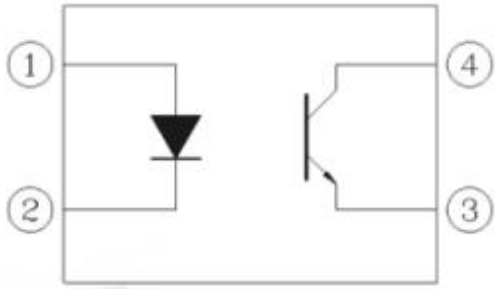
2. 产品描述 Product Description

- KL851由红外发射二极管与光电晶体管耦合, 组成光电耦合器。
  The KL851 series devices consist an infrared emitting diodes, optically coupled to a photo transistor detector.
- 此器件采用4引脚DIP封装，提供宽引脚间距和SMD选项
  The devices are in a 4-pin DIP package and available in wide-lead spacing and SMD option.

3. 产品应用 Product Applications

- 电话线接口Telephone line interface
- 与电源电路的接口 Interface to power supply circuit
- SSRS的控制器，直流电动机 Controller for SSRs. DC motor
- 可编程序控制器 Programmable Controllers

4. 示意图 Schematic



引脚配置 Pin Configuration
1. 阳极Anode
2. 阴极Cathode
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=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
	峰值正向电流（1μs脉冲） Peak forward current (1μs pulse)	I_{FM}	1	A
	反向电压 Reverse voltage	V_R	6	V
	功耗 Power dissipation	P_D	100	mW
输出 Output	集电极功耗 Collector power dissipation	P_C	150	mW
	集电极发射极电压 Collector-Emitter voltage	V_{CEO}	350	V
	集电极电流 Collector current	I_C	50	mA
	发射极-集电极电压 Emitter-Collector voltage	V_{ECO}	7	V
总消耗功率 Total Power Dissipation		P_{TOT}	200	mW
隔离电压 (1*) Isolation Voltage		V_{Iso}	5000	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%R.H.在此测试中，引脚1&2短接在一起，引脚3&4短接在一起。
AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1&2 are shorted together, and pins 3&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 In put	正向电压 Forward voltage	V_F	-	1.2	1.4	V	I_F=10mA
	反向电流 Reverse current	I_R	-	-	10	μA	V_R=5V
	输入电容 Input capacitance	C_{in}	-	30	250	pF	V=0, f=1kHz
输出 Out put	集电极与发射极间暗电流 Collector-Emitter dark current	I_{CEO}	-	-	100	nA	V_{CE}=200V I_F =0mA
	集电极与发射极间击穿电压 Collector-Emitter breakdown voltage	V_{CEO}	350	-	-	V	I_C=0.1mA I_F=0mA
	发射极与集电极间击穿电压 Emitter-Collector breakdown voltage	V_{ECO}	7	-	-	V	I_E=0.1mA I_F=0mA
	集电极电容 Collector-Emitter capacitance	C_{CE}	-	10	-	pF	V_{CE}=0V f=1MHZ
传输特性 Transfer Characteristics	集电极与发射极间饱和电压 Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	-	0.4	V	I_F=20mA I_C=1mA
	电流传输比 Current transfer ratio(1*)	CTR	50	-	600	%	I_F=5mA V_{CE}=5V
	隔离电阻 Isolation resistance	R_{IO}	10^{11}	-	-	Ω	V_{IO}=500Vdc 40~60% R.H.
	输入输出电容 Input-output capacitance	C_{IO}	-	0.6	-	pF	V_{IO}=0, f=1MHz
	上升时间 Rise time	t_r	-	4	18	μs	V_{CE}=2V, I_C=2mA, R_L=100Ω
	下降时间 Fall time	t_f	-	5	18	μs	

• 温度Ta=25℃下规格值 Typical values at Ta = 25°C

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

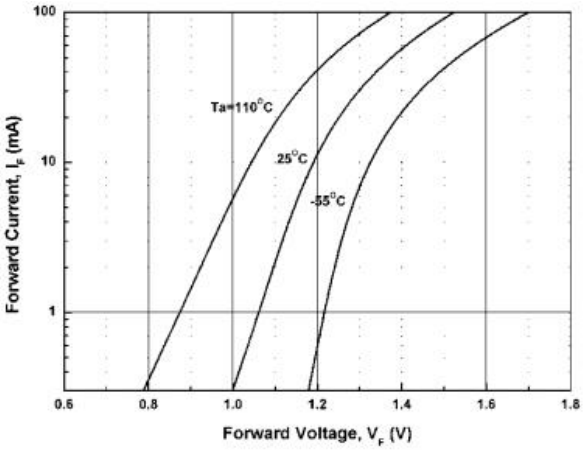


图2 电流传输比与正向电流的关系

Fig.2 Current Transfer Ratio vs Forward Current

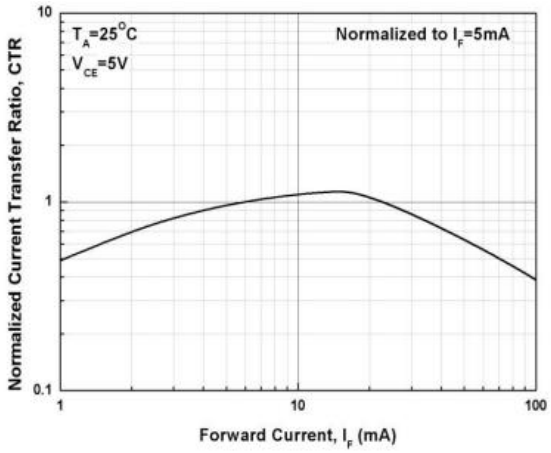


图3 集电极电流与集电极发射极电压的关系

Fig.3 Collector Current vs Collector Emitter Voltage

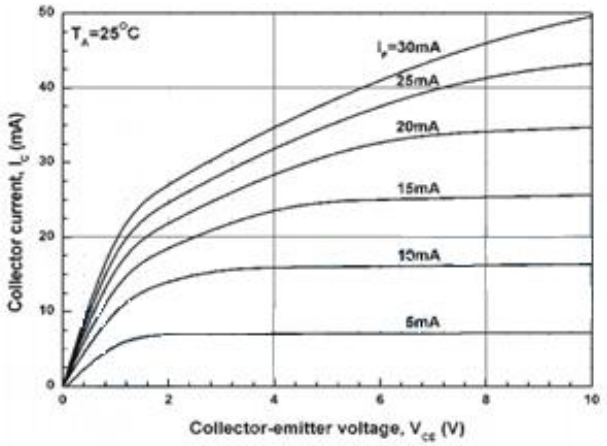


图4 相对电流传输比与环境温度的关系

Fig.4 Relative Current Transfer Ratio vs Ambient Temperature

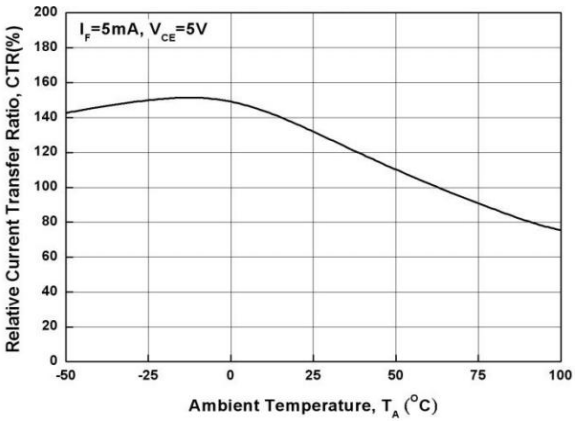


图5.集电极-发射极饱和电压与环境温度的关系

Fig.5 Collector-emitter Saturation Voltage vs Ambient Temperature

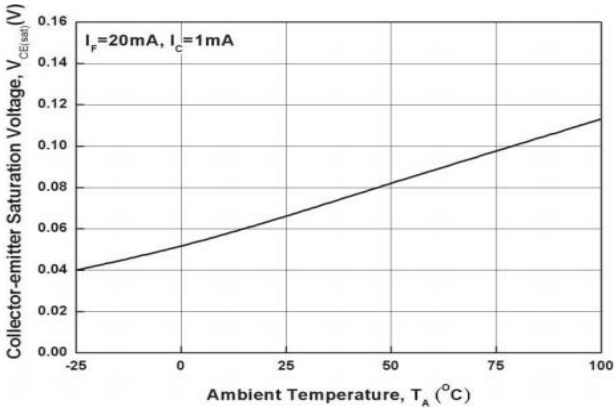


图6 暗电流与环境温度的关系

Fig.6 Dark Current vs Ambient Temperature

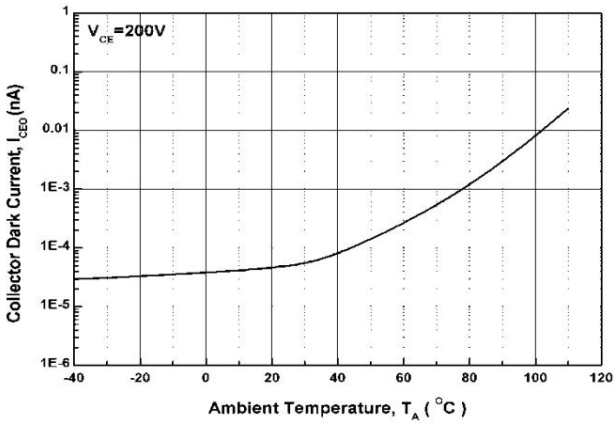


图7. 开关时间与负载电阻的关系

Fig.7 Switching Time vs Load Resistance

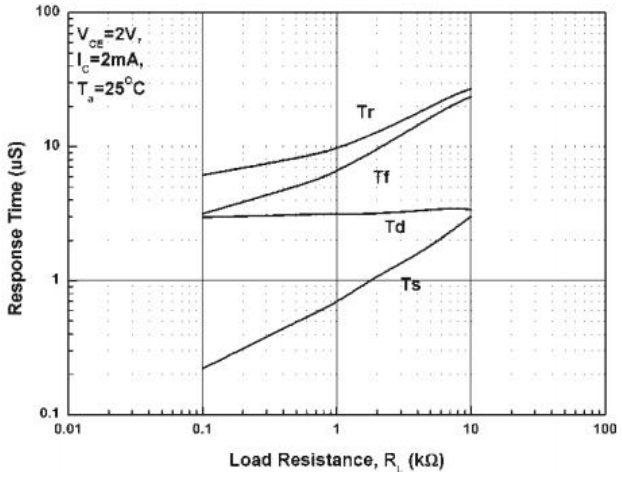


图8.集电极-发射极饱和电压与正向电流的关系

Fig.8 Collector-emitter Saturation Voltage vs Forward Current

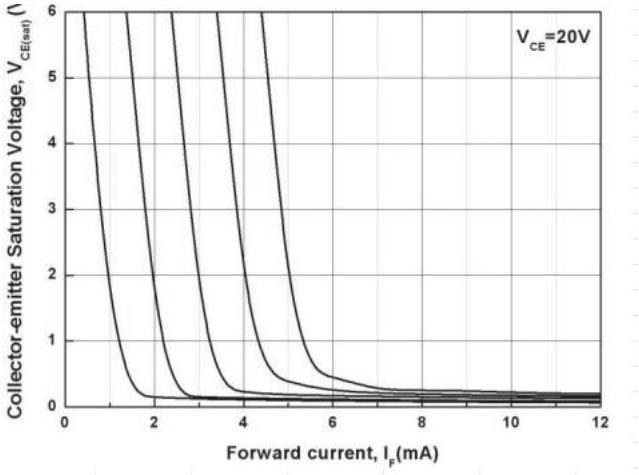
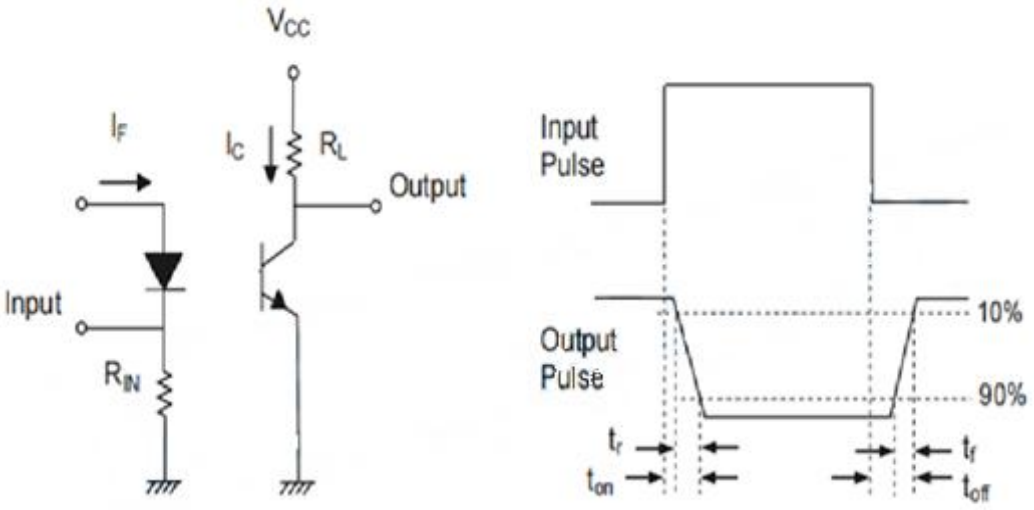


图9 开关时间测试电路及波形

Fig 9. Switching Time Test Circuit & Waveform



8. 订单信息 Order Information

• 零件编号 Part Number

KL851X-Z-V

附注(Notes):

X = 表示引脚形式选项(S1、M或无)
Lead form option (S1, M or none)

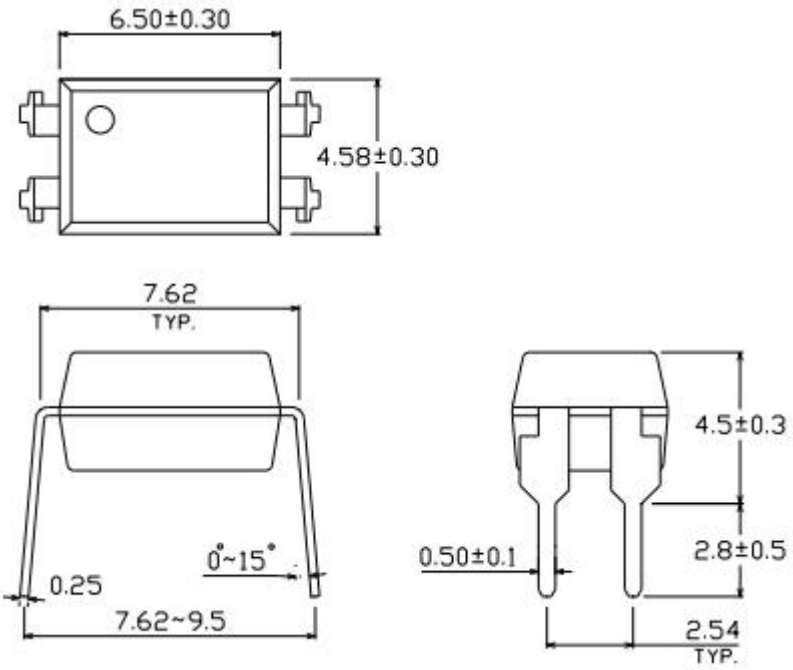
Z = 表示料带和卷盘选项(TA、TB、TU、TD 或 无)
Tape and reel option (TA, TB, TU, TD or none)

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)

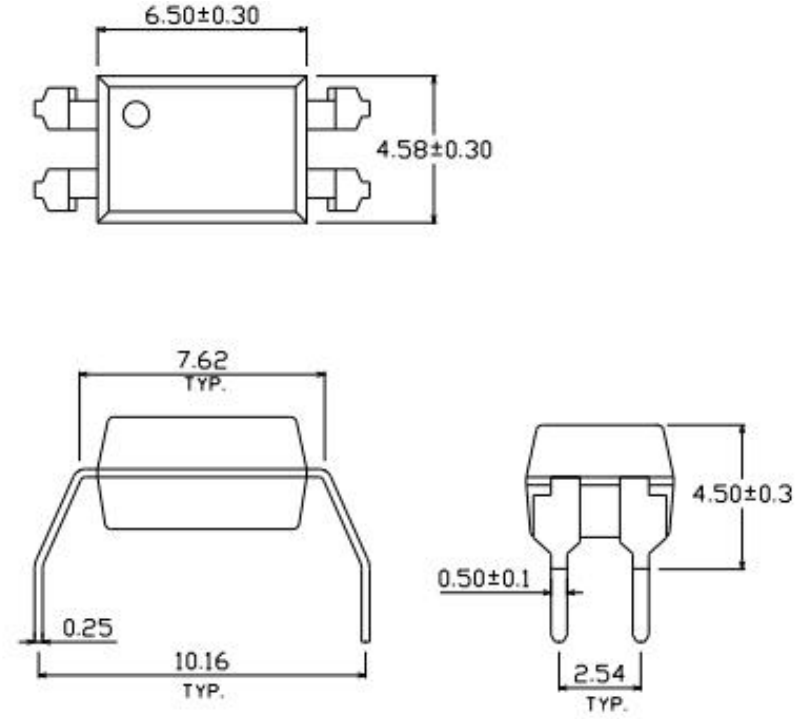
选项 Option	描述 Description	包装数量 Packing quantity
直脚None	标准DIP-4 Standard DIP-4	每管100pcs 100 units per tube
M脚	折弯脚(0.4英寸间距) Wide lead bend (0.4 inch spacing)	每管100pcs 100 units per tube
S1-TA	表面贴装脚型方式(低轮廓)+ TA料带 & 卷轴选择 Surface mount lead form (low profile) + TA tape & reel option	每卷1000pcs 1000 units per reel
S1-TB	表面贴装脚型方式(低轮廓)+ TB料带 & 卷轴选择 Surface mount lead form (low profile) + TB tape & reel option	每卷1000pcs 1000 units per reel
S1-TU	表面贴装脚型方式(低轮廓)+ TU料带 & 卷轴选择 Surface mount lead form (low profile) + TU tape & reel option	每卷1500pcs 1500 units per reel
S1-TD	表面贴装脚型方式(低轮廓)+ TD料带 & 卷轴选择 Surface mount lead form (low profile) + TD tape & reel option	每卷1500pcs 1500 units per reel

9. 包装尺寸(单位:毫米) Package Dimension(Dimension in mm)

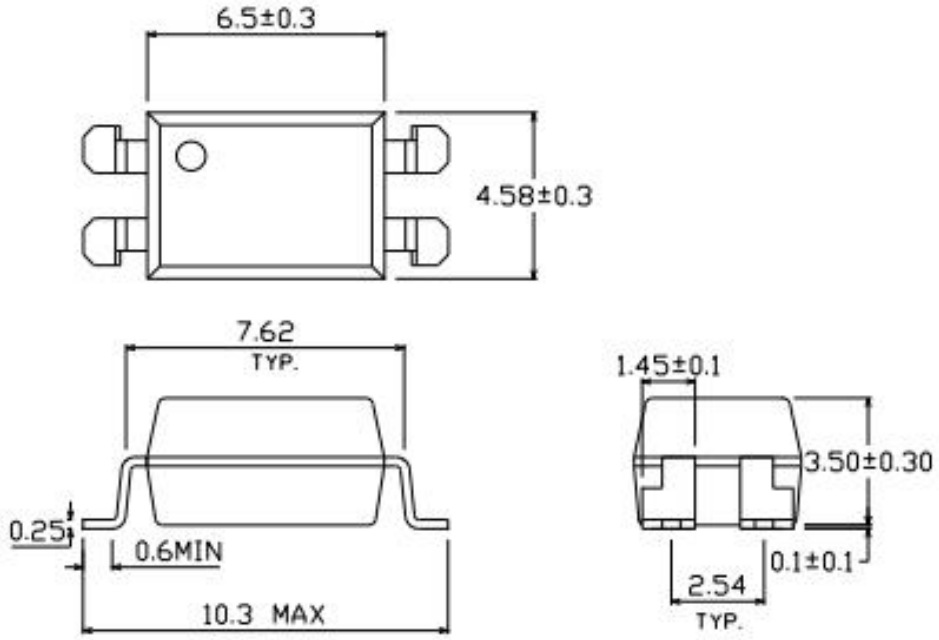
• **标准DIP型号 Standard DIP Type**



• **选择M型号 Option M Type**

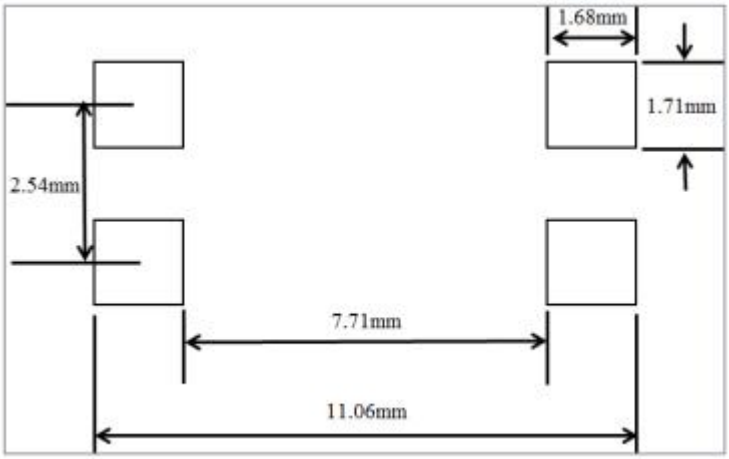


• **选择S1型号 Option S1 Type**



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

S1脚型焊盘 S1 Options

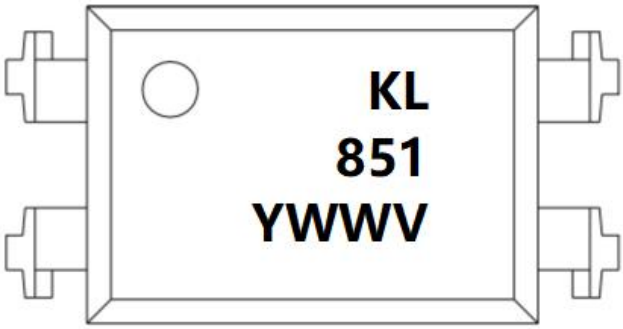


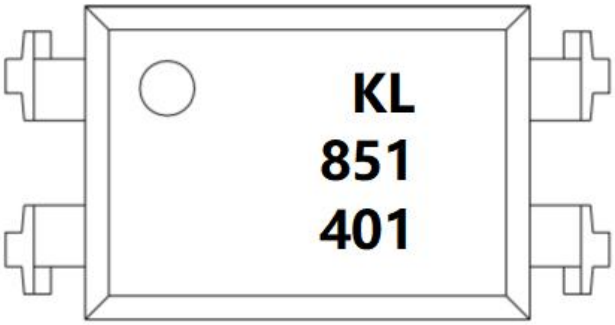
附注(Notes):

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 need

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

851 = 表示材料部件号 Denotes Device Part Number

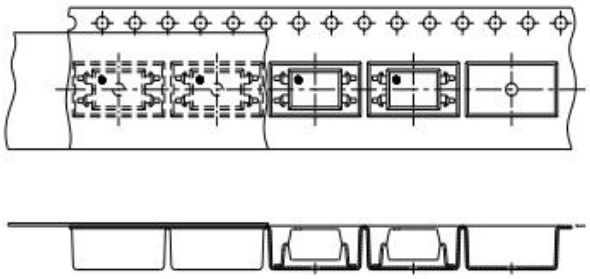
Y = 表示1位年份代码 Denotes 1 digit Year code

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)

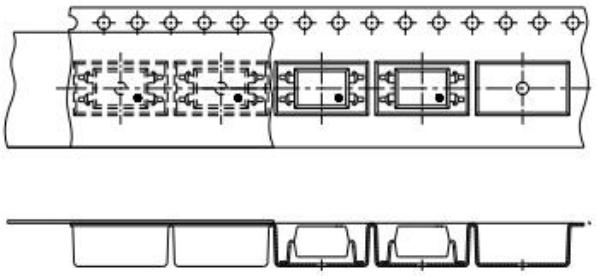
11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



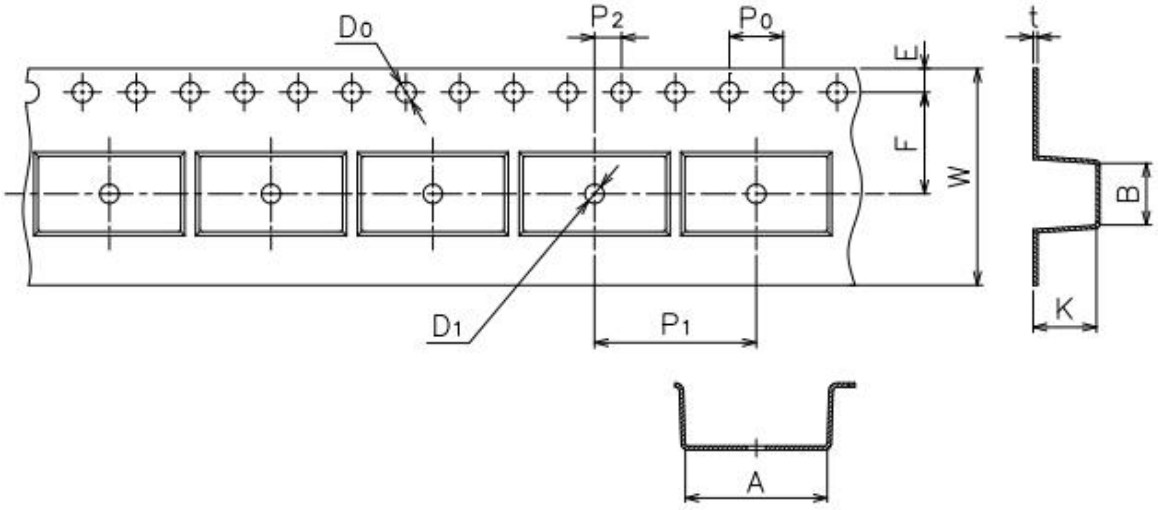
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

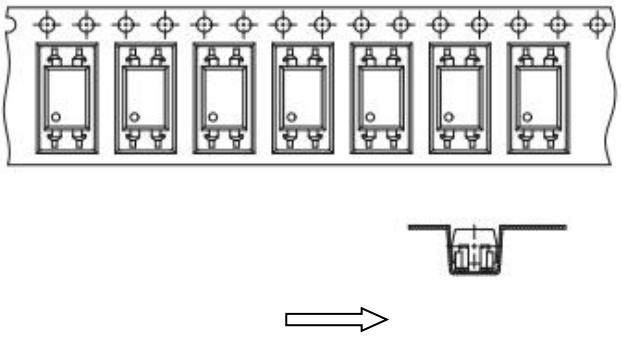
料带尺寸Material belt size



尺寸编号 Dimension No.	A	B	D0	D1	E	F
S1尺寸(mm) S1 Dimension(mm)	10.7±0.1	4.65±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
尺寸编号 Dimension No.	P0	P1	P2	t	W	K
S1尺寸(mm) S1 Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	3.9±0.1

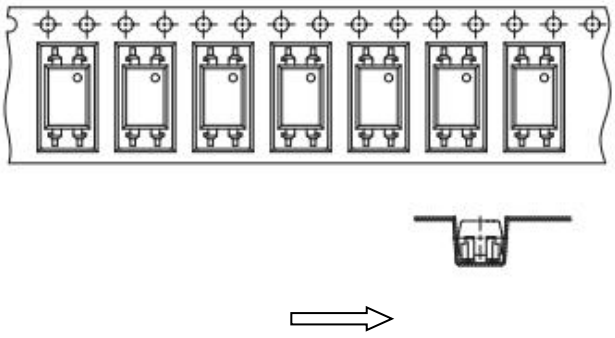
料带和卷轴包装规格Tape & Reel Packing Specifications

• 选择TD Option TD



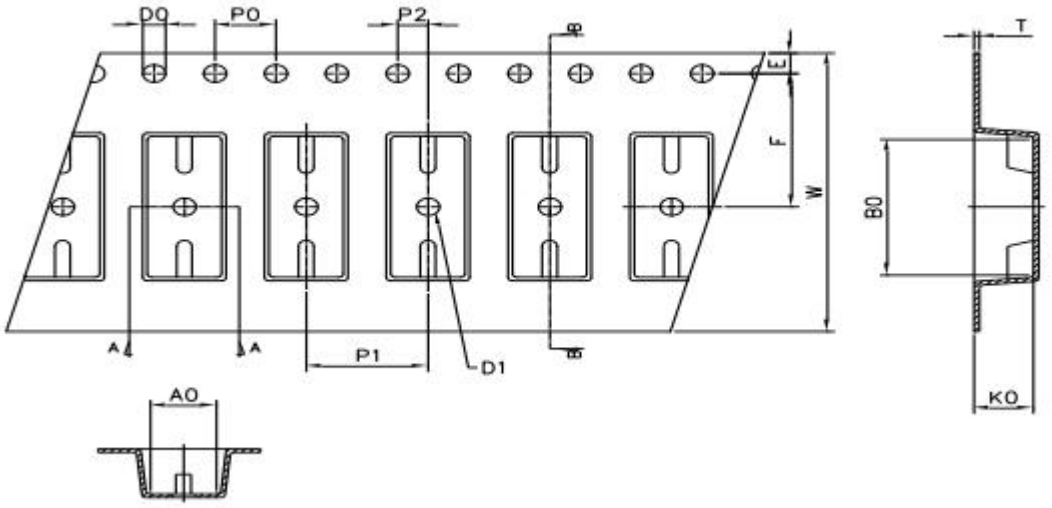
卷轴进给方向 Direction of feed from reel

• 选择TU Option TU



卷轴进给方向 Direction of feed from reel

料带尺寸Material belt size



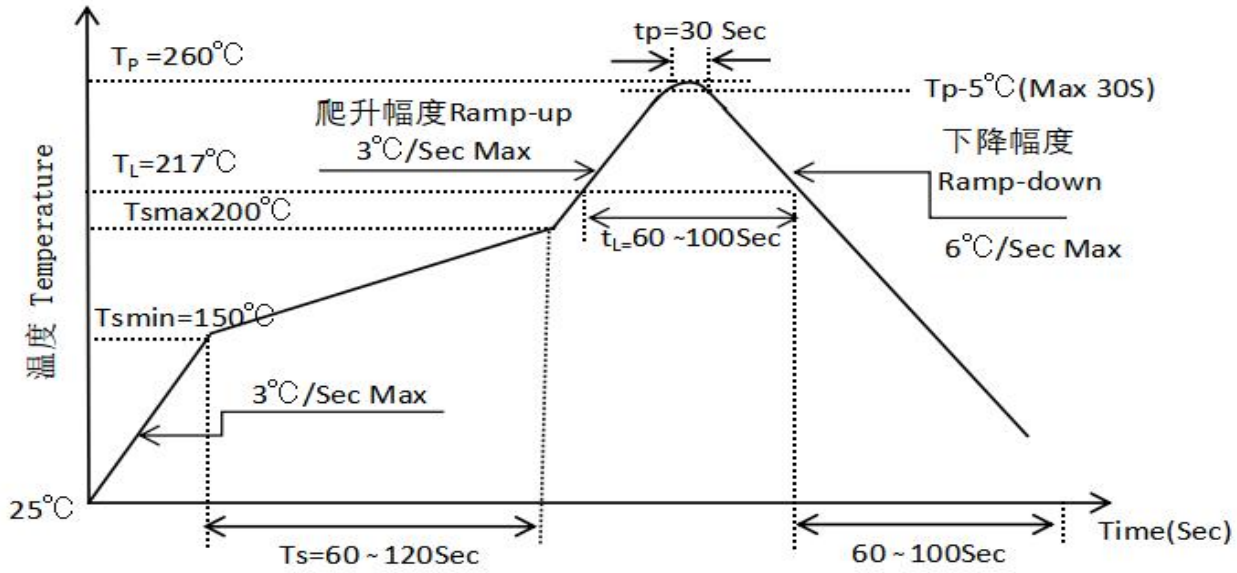
尺寸编号 Dimension No.	A0	B0	D0	D1	E	F
尺寸(mm) Dimension(mm)	4.9±0.1	10.4±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
尺寸编号 Dimension No.	P0	P1	P2	t	W	K0
尺寸(mm) Dimension(mm)	4.0±0.1	8.0±0.1	2.0±0.1	0.4±0.1	16.0±0.3	4.6±0.1

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.

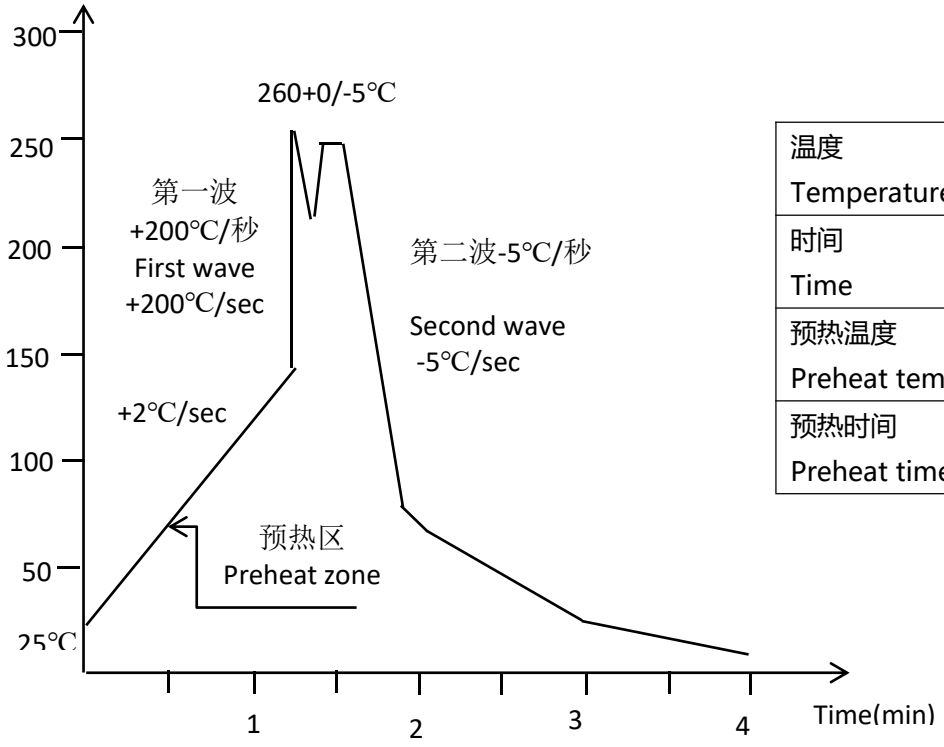


项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	T_s	150	200	℃
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
高于液相线温度(T_L)的时间 Time above Liquidus Temperature T_L	t_L	60	100	s
峰值温度 Peak Temperature	T_P	-	260	℃
T_c 在(T_P-5)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 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 Temperature	260℃+0/-5℃
时间 Time	10秒 10S
预热温度 Preheat temperature	25至140℃ 25 to 140℃
预热时间 Preheat time	30至80秒 30 to 80 S