Kinglight®
晶台微电子

KL354N

SOP4 PHOTOTRANSISTOR

SOP4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: Min. 20% at I_F =±1mA, V_{CE} =5V
- 无卤素 (溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Halogens free (Br < 900 ppm， Cl < 900 ppm, Br+ Cl < 1500 ppm)
- 输入与输出高隔离电压(V_{iso}=3750 Vrms)
  High isolation voltage between input and output (V_{iso}=3750 Vrms)
- 紧凑型小外型包装
  Compact small outline package
- 符合欧盟 REACH 法规 Compliance with EU REACH
- 无 Pb 且符合 ROHS 标准 Pb free and compliant with RoHS standards
- 安全审批 Safety approval
  CQC认证已批准(编号:CQC23001408001) CQC approved (No.CQC23001408001)
  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)

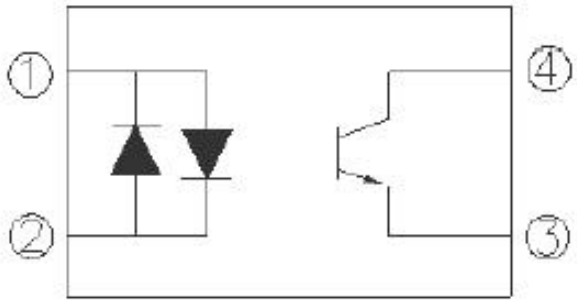
2. 产品描述 Product Description

- KL354N系列由两个红外发射二极管组成，以逆平行连接，光耦合到一个光电晶体管构成光耦合器
  KL354N series of devices each consist of two infrared emitting diodes ,connected in inverse parallel, optically coupled to a phototransistor detector
- 它们采用4引脚小外形封装方式
  Packaged in a 4-pin small outline package

3. 产品应用 Product Applications

- 可编程式控制器 Programmable controllers
- 交流线路检测器 AC line monitor
- 电话线路接口 Telephone line interface
- 未知级性直流传感器 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=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	±50	mA
	峰值正向电流(1us脉冲) Peak forward current (1us pulse)	I_{FP}	1	A
	功率 Power dissipation 减额系数(Ta=90℃) Derating factor (above Ta=90℃)	P_D	70	mW
输出 Output	集电极与发射极间电压 Collector-Emitter Voltage	V_{CEO}	80	V
	发射极与集电极间电压 Emitter-Collector Voltage	V_{ECO}	6	V
	功率 Power dissipation	P_C	150	mW
	减额系数(Ta=70℃) Derating factor (above Ta=70℃)		3.7	mW/℃
总消耗功率 Total Consume Power		P_{TOT}	200	mW
隔离电压 (*1) Isolation Voltage*1		V_{ISO}	3750	Vrms
工作温度 Operating temperature		T_{OPR}	-55 ~ +100	℃
储存温度 Storage temperature		T_{STG}	-55 ~ +125	℃
焊接温度 (*2) Soldering temperature*2		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脚短路一起, 3&4脚短路一起
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	-	1.2	1.4	V	I_F=±20mA
	输入电容 Input capacitance	C_{In}	-	50	250	pF	V=0, f=1kHz
输出 Output	集电极与发射极间暗电流 Collector-Emitter dark current	I_{CEO}	-	-	100	nA	V_{CE}=20V I_F =0mA
	集电极与发射极间击穿电压 Collector-Emitter breakdown voltage	V_{CEO}	80	-	-	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
传输特性 Transfer Characteristics	集电极与发射极间饱和电压 Collector-Emitter saturation voltage	$V_{CE(sat)}$	-	0.1	0.2	V	I_F=±20mA I_C=1mA
	KL354N 电流传输比 Current transfer ratio	CTR	20		300	%	I_F=±1mA V_{CE}=5V
	KL354NA 电流传输比 Current transfer ratio		50	-	150		
	KL354NB 电流传输比 Current transfer ratio		80	-	300		
	隔离电阻 Isolation resistance	R_{IO}	5×10^{10}	10^{11}	-	Ω	V_{IO}=500Vdc 40~60% R.H.
	浮动电容 Floating capacitance	C_{IO}	-	0.6	1.0	pF	V_{IO}=0, f=1MHz
	截止频率 Cut-off frequency	fc	-	80	-	kHz	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB
	上升时间 Rise time	t_r	-	-	18	μs	V_{CE}=2 V, I_C=2mA, R_L=100Ω
	下降时间 Fall time	t_f	-	-	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

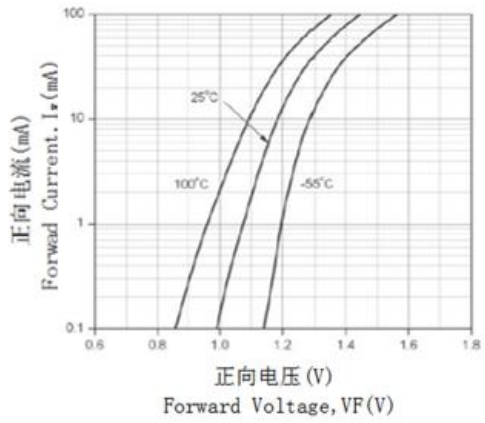


图2 集电极电流vs正向电流曲线图

Fig.2 Normalized Collector Current vs Forward Current

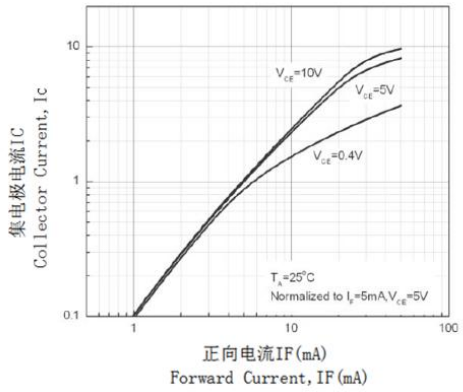


图3 电流转换比 vs正向电流曲线图

Fig.3 Current Conversion Ratio vs Forward Current Curve

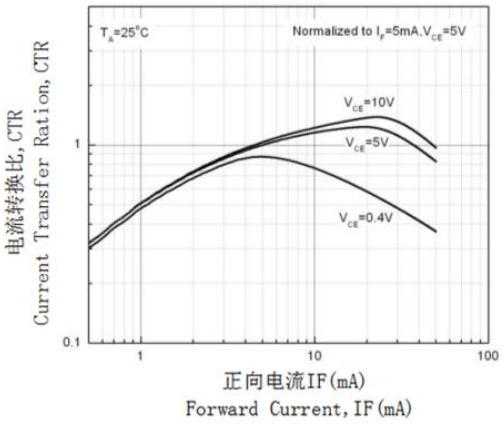


图4 集电极电流 vs环境温度曲线图

Fig.4 Collector Current vs Ambient Temperature

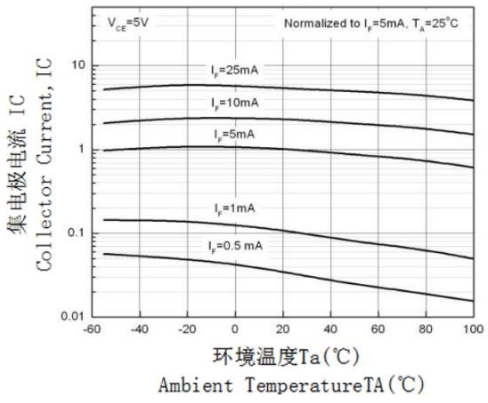


图5 集电极电流 vs 集电极-发射电压曲线图

Fig.5 Collector Current vs Collector-Emitter Voltage

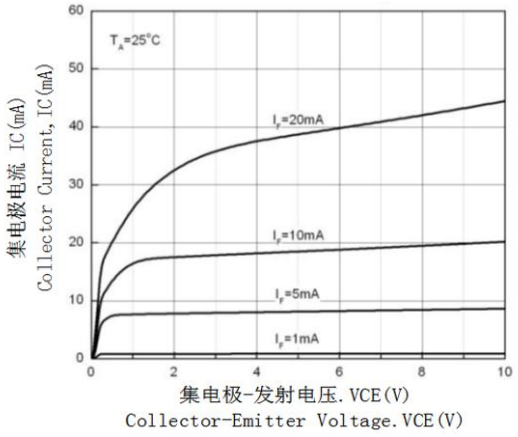


图6 集电极电流 vs 集电极-发射电压曲线图

Fig.6 Collector Current vs Collector-Emitter Voltage

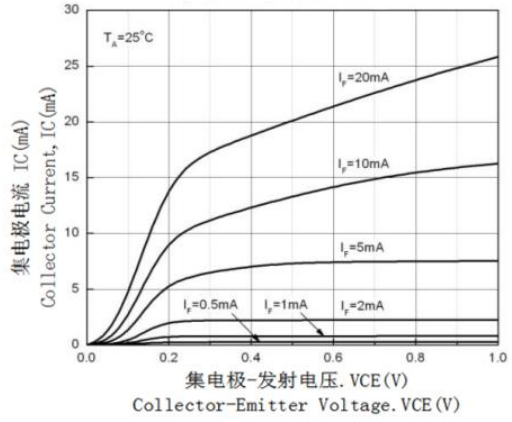


图7 集电极暗电流 vs 环境温度曲线图
Fig.7 Collector Dark Current vs Ambient Temperature

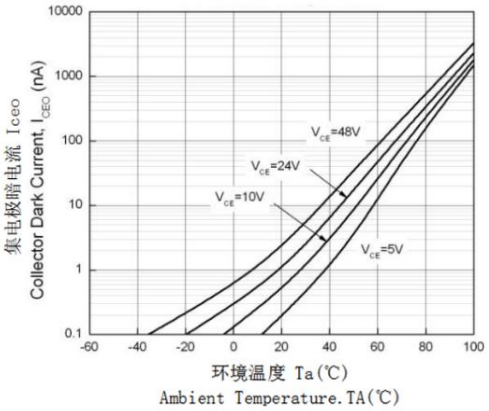


图8 响应时间 vs 负载电阻曲线图
Fig.8 Response Time vs Load Resistance

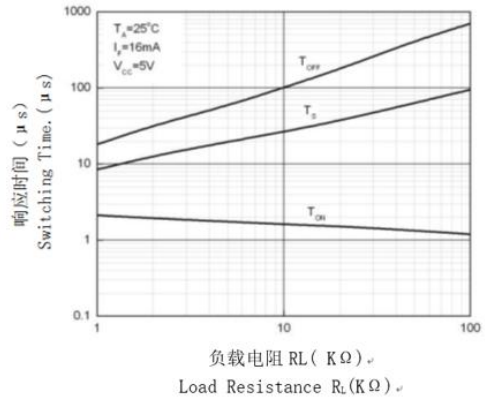


图9 集电极-发射极饱和电压 vs 环境温度曲线图
Fig.9 Collector-Emitter Saturation Voltage Drop vs Ambient Temperature

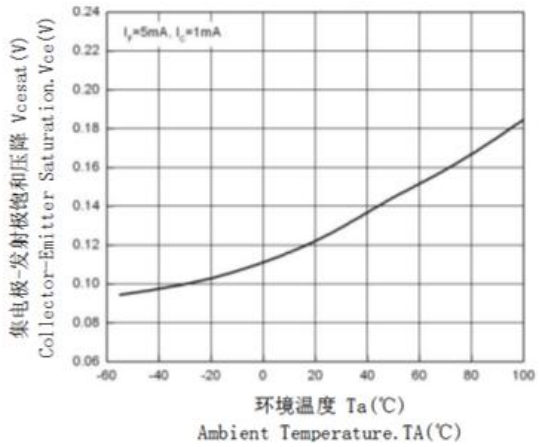
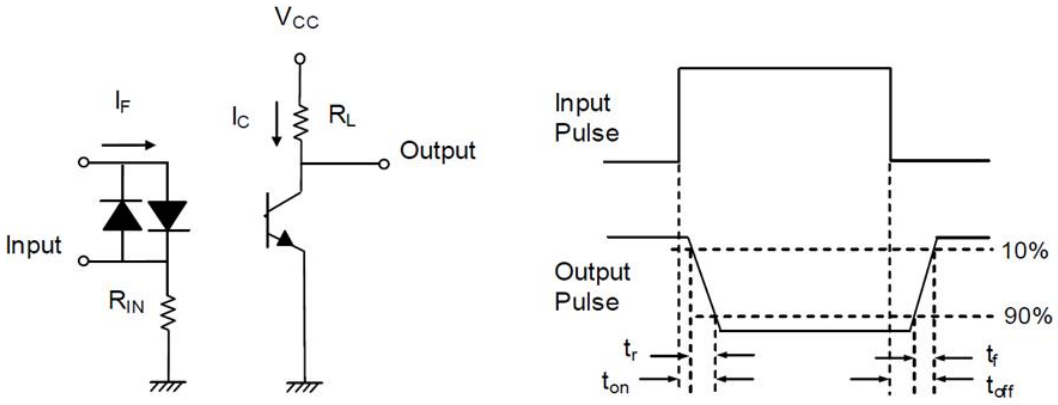


图10 开关时间测试电路及波形
Fig. 10. Switching Time Test Circuit & Waveforms



8. 订单信息 Order Information

• 零件编号 Part Number

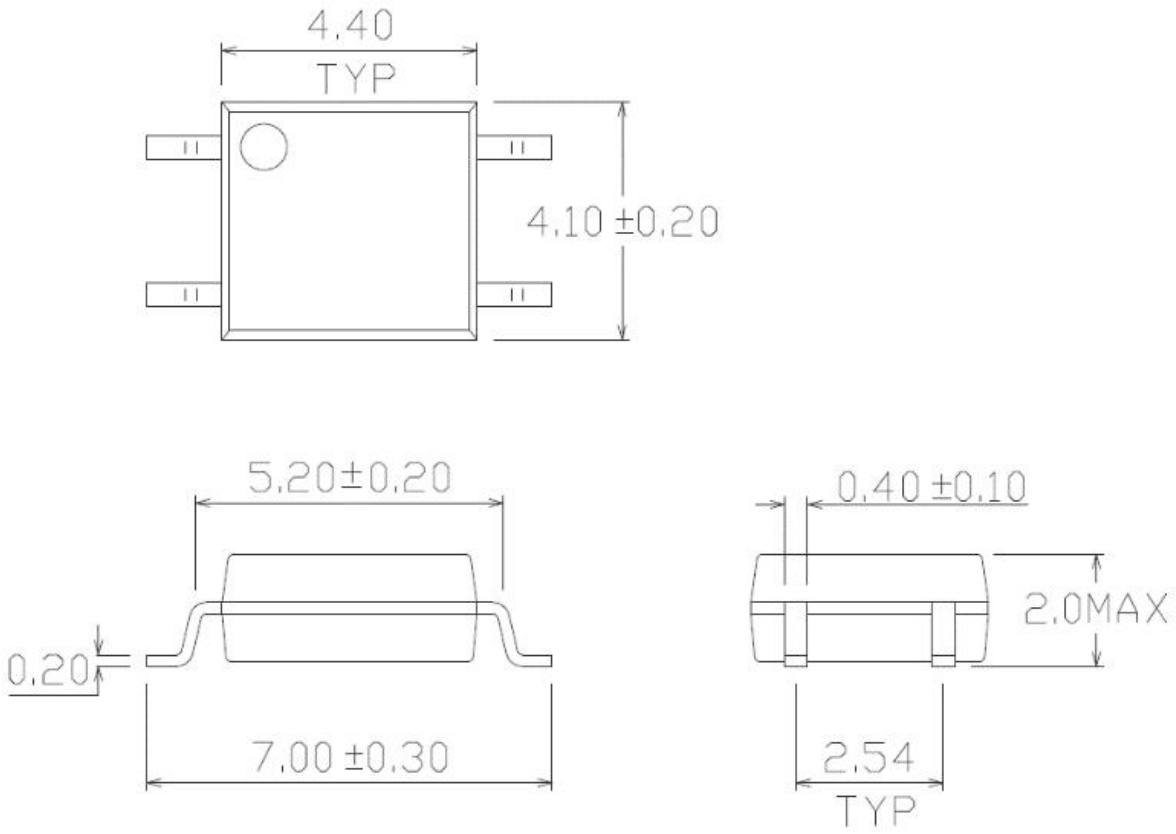
KL354N-X-Y-V

附注(Notes):

X = 表示CTR等级(A、B 或 无)
CTR Rank option (A，B or none)
Y = 表示料带和卷盘选项(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)

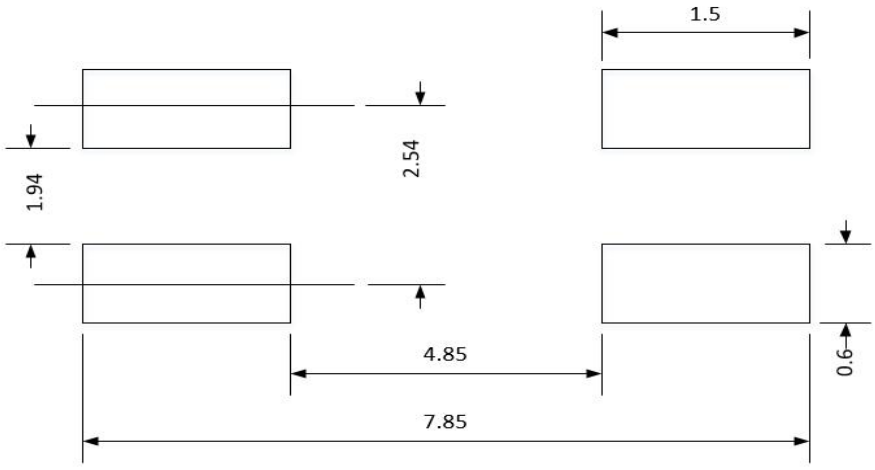
选项 Option	描述 Description	包装数量 Packing quantity
None	标准SMD选项 Standard SMD option	每管100pcs 100 units per tube
-V	标准SMD选项+VDE Standard SMD option+VDE	每管100pcs 100 units per tube
(TA)	TA料带 & 卷轴选择 TA tape & reel option	每卷3000pcs 3000 units per reel
(TB)	TB料带 & 卷轴选择 TB tape & reel option	每卷3000pcs 3000 units per reel
(TA)-V	TA料带 & 卷轴选择+VDE TA tape & reel option+VDE	每卷3000pcs 3000 units per reel
(TB)-V	TB料带 & 卷轴选择+VDE TB tape & reel option+VDE	每卷3000pcs 3000 units per reel
/	内盒装: 每盒3盘 Inner box packaging: 3reels/box	每盒9000pcs 9000pcs per box
/	每箱装:10个内盒 Pack per Carton:10 inner boxes	每箱90000pcs 90000pcs per Carton

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



• 表面贴装引线框架推荐焊盘布局

Recommended pad layout for surface mount lead frame



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

354N = 表示设备部件号 Denotes Device Part Number

R = 表示CTR等级(A、B 或 无) Denotes CTR Rank (A，B or none)

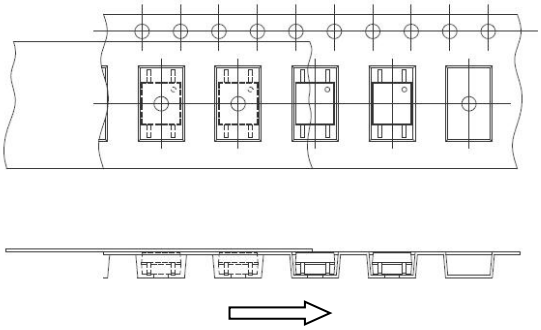
Y = 表示1位年份代码 Denotes 1 digit Year code

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)

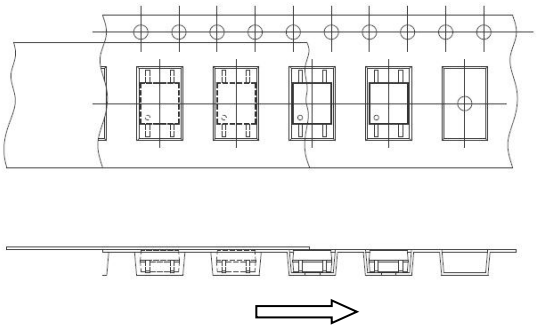
11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



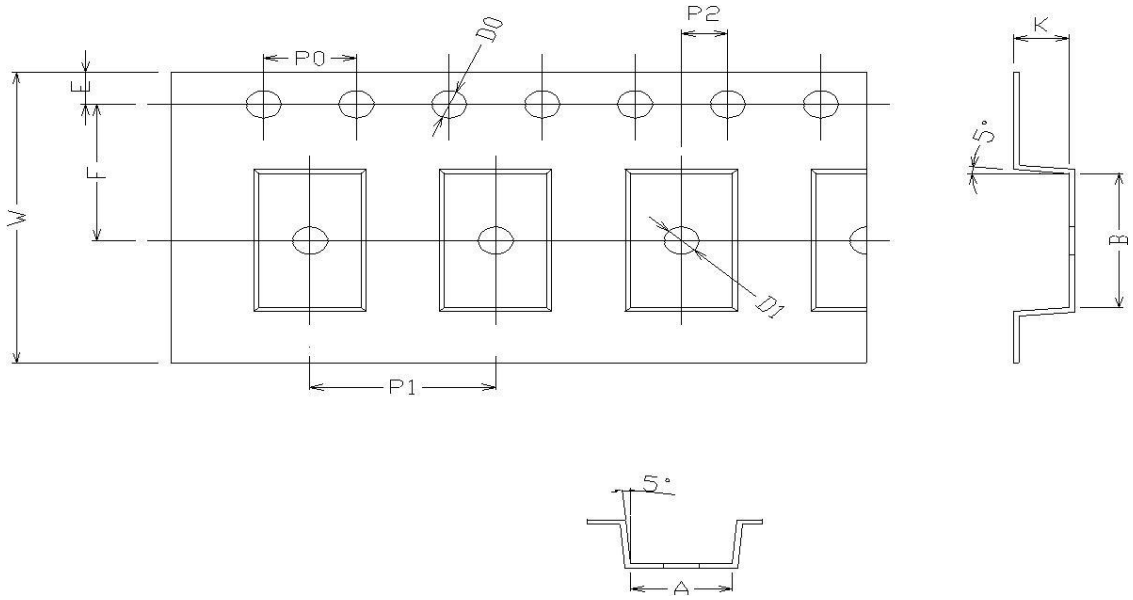
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

料带尺寸Material belt size



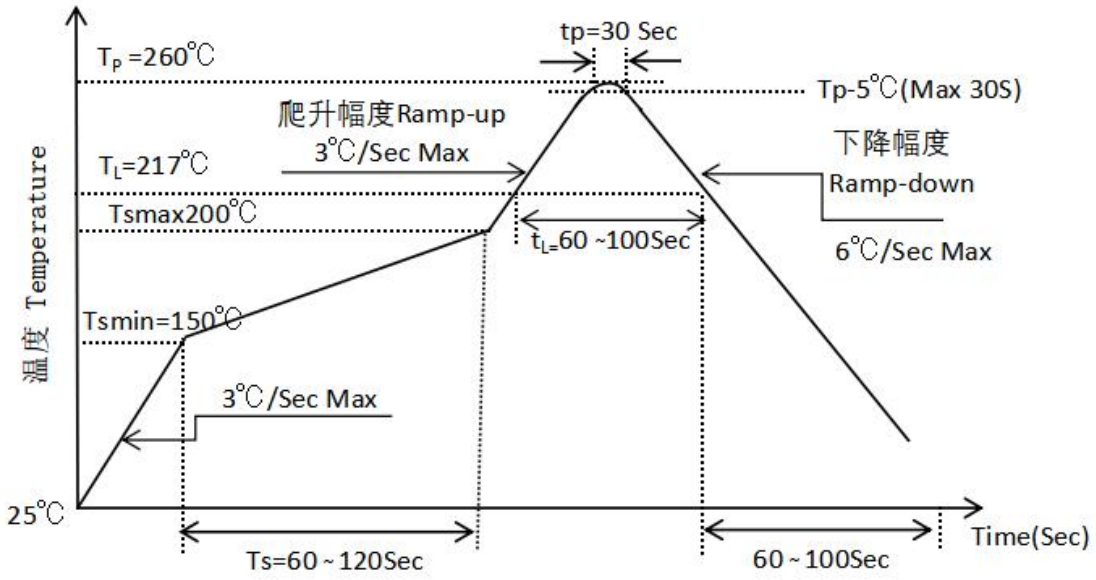
尺寸编号 Dimension No.	A	B	D0	D1	E	F
尺寸(mm) Dimension(mm)	4.4±0.1	7.6±0.1	1.5+0.1/-0	1.5±0.1	1.75±0.1	7.5±0.05
尺寸编号 Dimension No.	P0	P1	P2	t	W	K
尺寸(mm) Dimension(mm)	4.0±0.05	8.0±0.1	2.0±0.05	0.25±0.03	16.0±0.2	2.4±0.1

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 Item	符号 Symbol	最小值 Min	最大值 Max	单位 Unit
预热温度 Preheat Temperature	Ts	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	℃
介于(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_c	-	30	s
降温速率 Ramp-down Rate(T_P to T_L)	-	-	6	℃/s