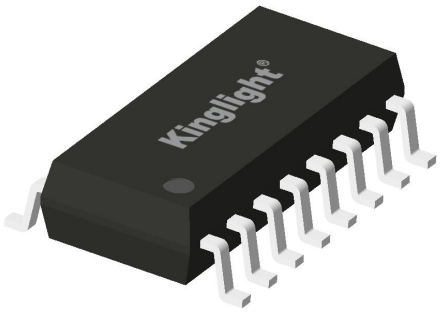
KLQ3H4

16 PIN ULTRA SMALL SSOP AC INPUT PHOTOTRANSISTOR PHOTOCOUPLER

SSOP16 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.
＊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

- 交流输入响应 AC input response
- 电流转换率 Current transfer ratio

  CTR: 20%~300% 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)
- 紧凑型 16 引脚 SSOP，外形尺寸为 2.0 毫米 Compact 16 Pin SSOP with a 2.0 mm profile
- 符合无卤素 Halogen Free
- 无铅且符合 RoHS 规范 Pb free and RoHS compliant

2. 产品描述 Product Description

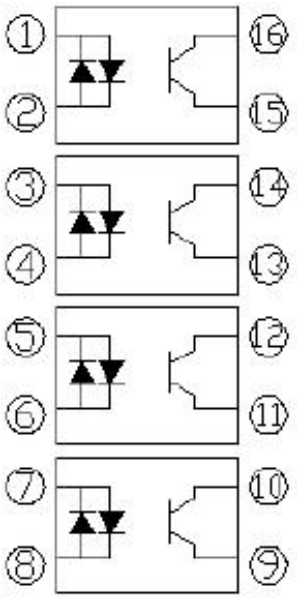
•KLQ3H4 光电耦合器包含 GaAs 发光二极管和 NPN光电晶体管，采用 SSOP 封装，适用于高密度应用场景，该封装方式具有屏蔽效果，可隔绝周围光线。

The KLQ3H4 is optically coupled isolator containing GaAs light emitting diodes and an NPN silicon phototransistor in a plastic SOP for high density applications. This package has shield effect to cut off ambient light.

3. 产品应用 Product Applications

- 可编程控制器 Programmable controllers
- 测量设备 Measuring instruments
- 混合集成电路 Hybrid IC

4. 功能图 Functional Diagram



引脚配置 Pin Configuration

①, ③, ⑤, ⑦ 阳极/阴极 Anode / Cathode

②, ④, ⑥, ⑧ 阴极/阳极 Cathode / Anode

⑨, ⑪, ⑬, ⑮ 发射极 Emitter

⑩, ⑫, ⑭, ⑯ 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	±60	mA
	峰值正向电流(1μs脉冲) Peak forward current (1μs，pulse)	I_{FP}	1	A
	功耗 Power Dissipation	P_D	70	mW /Ch
	功耗降额 Power Dissipation Derating		0.7	mW/℃
输出 Output	功耗 Power dissipation	P_C	150	mW /Ch
	功耗降额 Power Dissipation Derating		1.4	mW/℃
	集电极电流 Collector current	I_C	50	mA
	集电极-发射极电压 Collector-Emitter Voltage	V_{CEO}	80	V
	发射极-集电极电压 Emitter-Collector Voltage	V_{ECO}	7	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 ~ +110	℃
储存温度 Storage temperature		T_{STG}	-55 ~ +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，LED 侧引脚短接在一起，探测器侧引脚短接在一起
AC for 1 minute，40~60%RH in this test, LED side pins shorted together, and detector side pins 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}	-	30	250	pF	V=0, f=1kHz
输出 Output	集电极-发射极暗电流 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
	发射极-集电极击穿电压 Emitter-Collector breakdown voltage	V_{ECO}	7	-	-	V	I_E=0.1mA
传输特性 Transfer Characteristics	CTR比值 CTR Ratio	CTR1/ CTR2	0.5	-	2.0	-	I_F=±1mA V_{CE}=5V
	集电极-发射极饱和电压 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}	$5x10^{10}$	-	-	Ω	V_{IO}=500Vdc 40~60% R.H.
	浮动电容 Floating capacitance	C_{IO}	-	0.3	1.0	pF	V_{IO}=0V f=1MHz
	上升时间 Rise Time	t_r	-	5	18	μs	V_{CE}=2V, I_C=2mA R_L=100Ω
	下降时间 Fall Time	t_f	-	3	18	μs	

• 传输特性等级表(T_a=-40℃ ~ 85℃, 除非另有规定)

Transfer Characteristics level table (T_a=-40℃ to 85℃ unless specified otherwise)

• 传输特性等级表(Ta=25℃, 除非另有规定)

Transfer Characteristics level table (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
电流传输比 Current Transfer Ratio	KLQ3H4	CTR	20	-	300	%	I_F=±1mA V_{CE}=5V
	KLQ3H4-B		100	-	400		
	KLQ3H4-K		100	-	400		I_F=±5mA V_{CE}=5V
	KLQ3H4-Y		150	-	400		

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

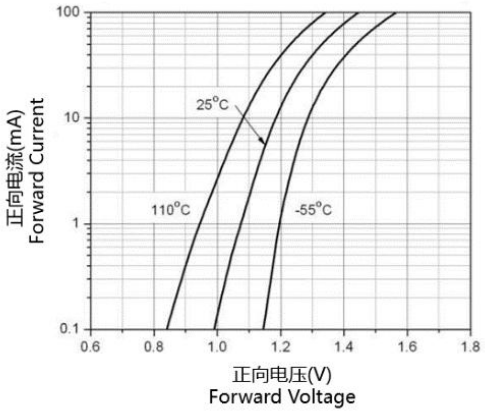


图2 集电极电流vs正向电流曲线图

Fig.2 Collector Current vs. Forward Current Diagram

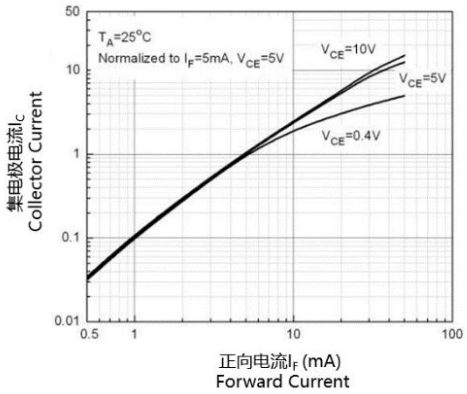


图3 电流转换比 vs正向电流曲线图

Fig.3 Current Transfer Ratio vs Forward Current Curve

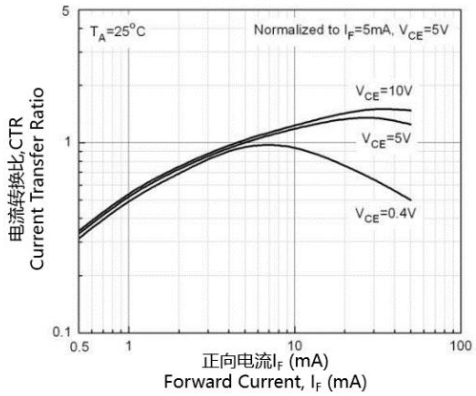


图4 集电极电流 vs环境温度曲线图

Fig.4 Collector Current vs. Ambient Temperature

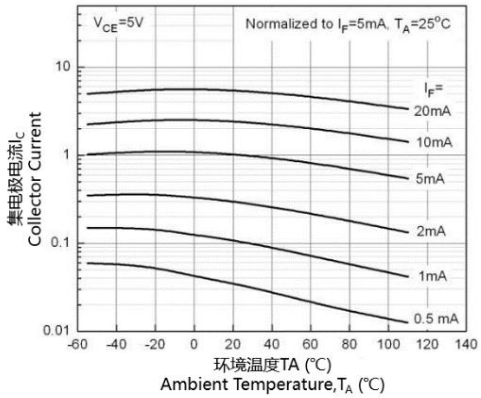


图5 电流转换比vs环境温度曲线图

Fig.5 Current Transfer Ratio vs Ambient Temperature Curve

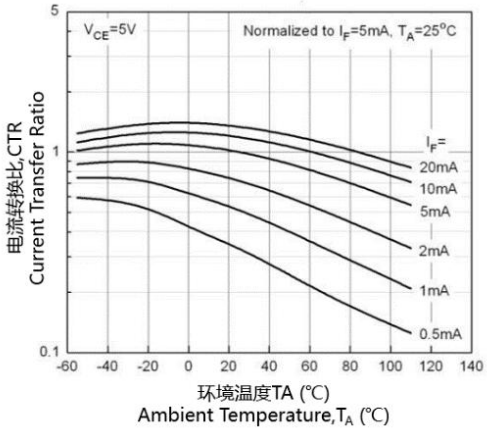


图6 集电极电流 vs 集电极-发射电压曲线图

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

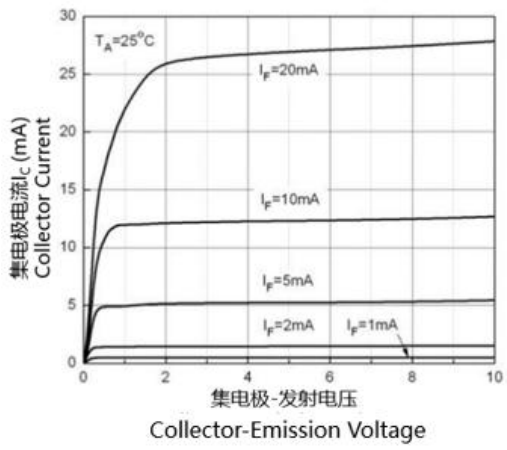


图7 集电极电流 vs集电极-发射电压曲线图

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

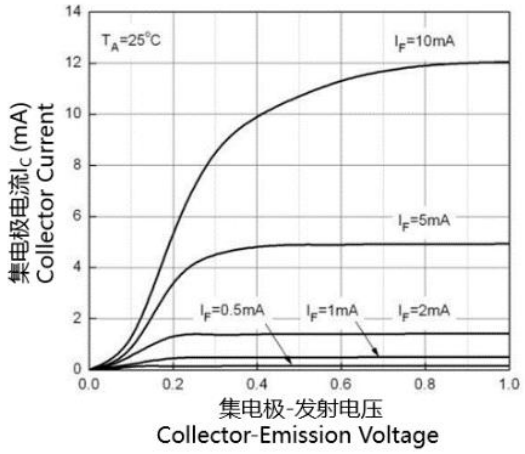


图8 集电极暗电流 vs 环境温度曲线图

Fig.8 Collector Dark Current vs. Ambient Temperature Curve

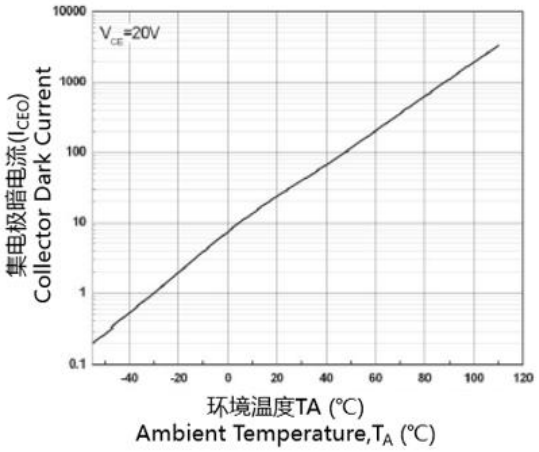


图9 集电极-发射极饱和电压 vs 环境温度曲线图

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

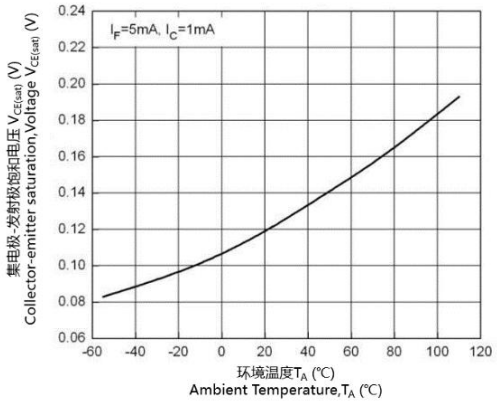


图10 响应时间 vs 负载电阻曲线图

Fig.10 Switching Time vs. Load Resistance Diagram

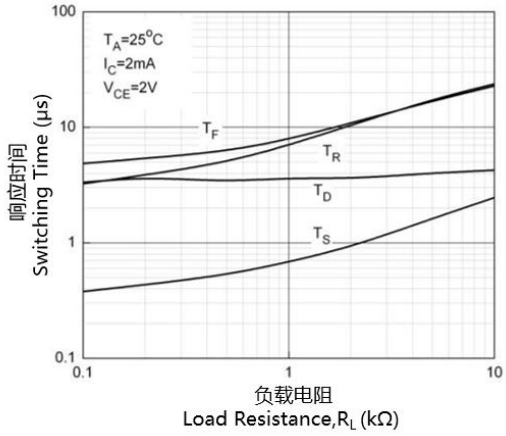
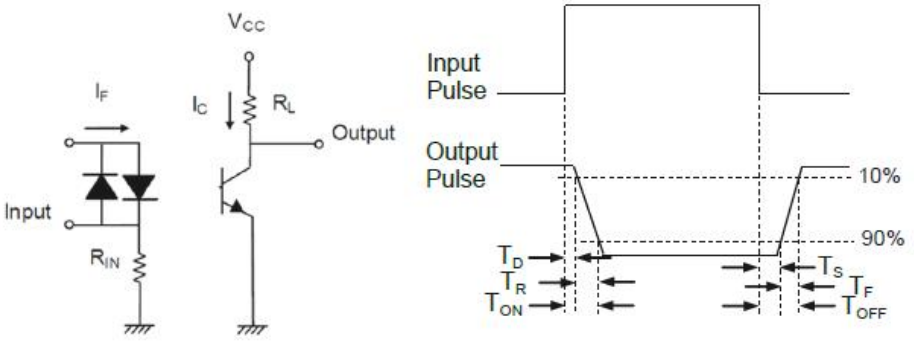


图11 开关时间测试电路及波形

Fig.11 Switching Time Test Circuit & Waveforms



8. 订单信息 Order Information

• 零件编号 Part Number

KLQ3H4-X-Z-V

附注(Notes):

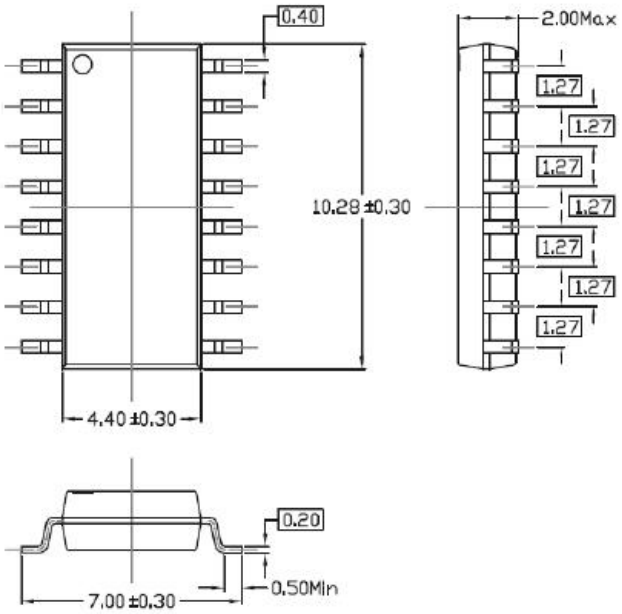
X = 表示CTR等级(B、Y、K 或无)
CTR Rank (B, Y, K or none)

Z = 载带和卷轴包装方式(TA 或 无)
Tape and reel option (TA or none)

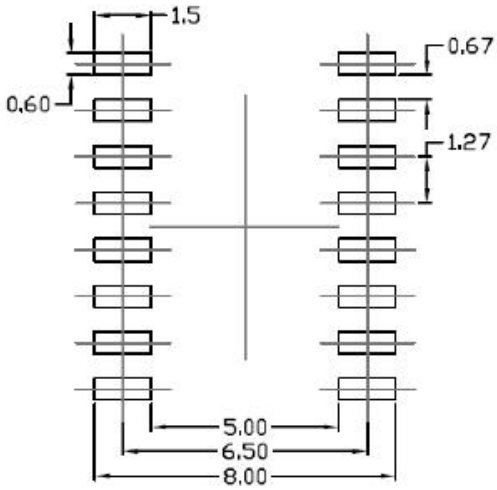
V = 表示VDE标识(客户指定镭射字符才加"V")
VDE (Only add "V" to laser characters specified by the customer)

选项 Option	描述 Description	包装数量 Packing quantity
None	KLQ3H4料管选项 Tube option of KLQ3H4	每管40pcs 40 units per tube
TA	KLQ3H4的载带 & 卷轴选择 tape & reel option of KLQ3H4	每卷1000pcs 1000 units per reel
/	内盒装：每盒3盘 Inner box packaging：3reels/box	每盒3000pcs 3000pcs per box
/	每箱装：10个内盒 Pack per Carton: 10inner boxes	每箱30000pcs 30000pcs 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

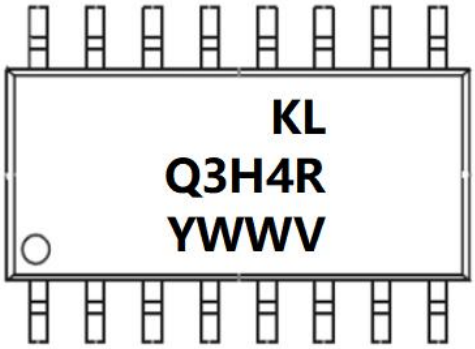


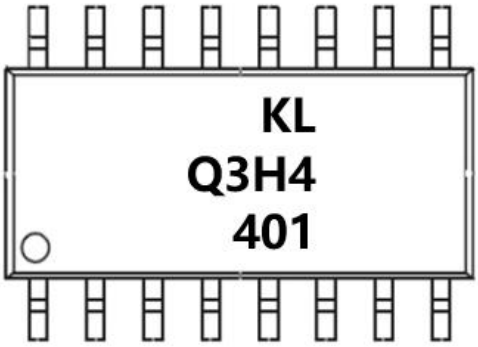
附注(Notes):

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)

备注Notes

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

Q3H4 = 表示设备部件号 Denotes Device Part Number

R = 表示CTR等级(B、Y、K 或无) CTR Rank (B, Y, K or none)

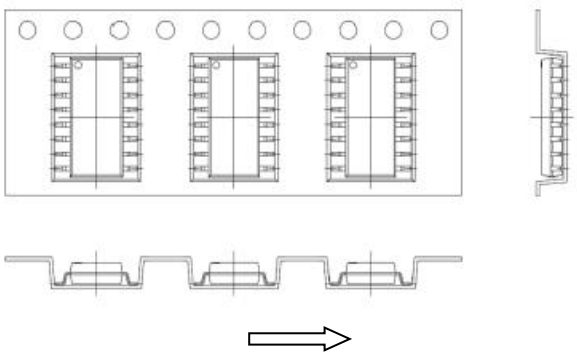
Y = 表示1位年份代码 Denotes 1 digit Year code

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)

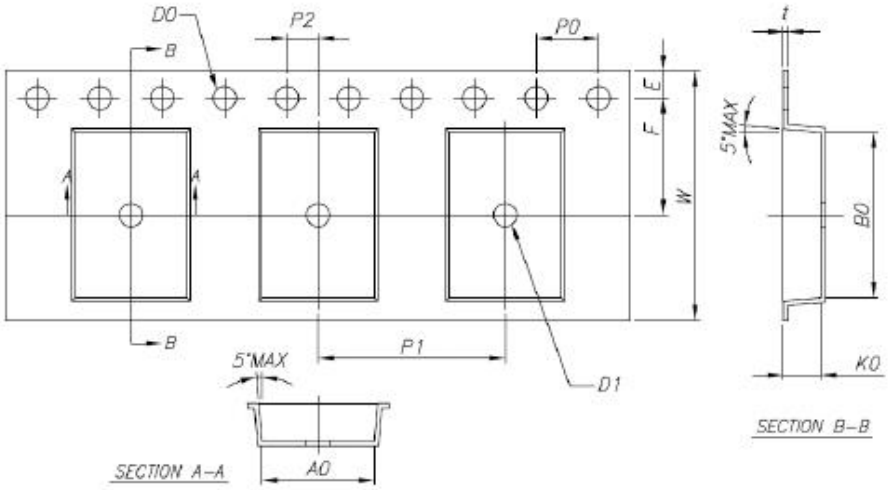
11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

KLQ3H4



卷轴进给方向 Direction of feed from reel

料带尺寸Material belt size



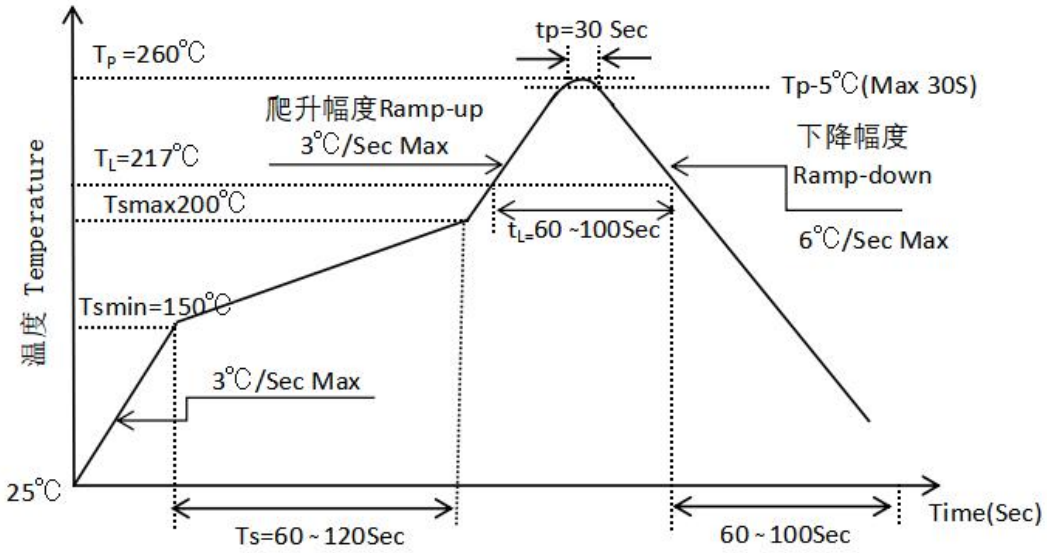
尺寸编号 Dimension No.	A0	B0	D0	D1	E	F
尺寸(mm) Dimension(mm)	7.2±0.1	10.6±0.1	1.5+0.1/-0	1.5+0.1/-0	1.75±0.1	7.5±0.1
尺寸编号 Dimension No.	P0	P1	P2	t	W	K0
尺寸(mm) Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.1	0.3±0.05	16.0±0.3	2.4±0.1

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	T_s	150	200	℃
预热时间 Preheat Time	t_s	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