KLM600, KLM601, KLM611
SOP5 HIGH SPEED 10MBit/s
LOGIC GATE PHOTOCOUPLER

SOP5 高速10MBit/s逻辑门光耦



＊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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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。
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1. 产品特点 Product features

- 高速10MBit/s High speed 10MBit/s
- 可保证在-40至85℃温度范围内运行 Guaranteed performance from -40°C to 85°C
- 逻辑门输出 Logic Gate Output
- 无卤素 (溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Halogens free (Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- 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)
- 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:CQC25001468793) CQC approved (No.CQC25001468793)
  UL认证已批准(编号：UL-US-2555216-0) UL approved (No.UL-US-2555216-0)
  VDE认证已批准(编号:40061363) VDE approved (No.40061363)

2. 产品描述 Product Description

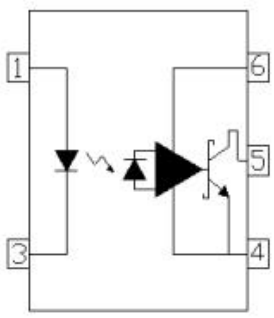
- KLM600, KLM601和KLM611由一个红外发射二极管和一个高速集成光电探测器逻辑门组成，后者具有频闪输出，采用 5 脚小型外形封装，符合标准封装。
  The KLM600, KLM601 and KLM611 consist of an infrared emitting diode optically coupled to a high speed integrated photo detector logic gate with a strobed output. The devices are packaged in 5pin small outline packages which conform to the standard footprint.

3. 产品应用 Product Applications

- 消除接地回路、 数据多路复用 Ground loop elimination、Data multiplexing
- LSTTL 至 TTL、LSTTL 或 5V CMOS LSTTL to TTL, LSTTL or 5 Volt CMOS
- 线路接收器、数据传输 Line receiver, data transmission
- 开关电源、脉冲变压器更换 Switching power supplies、Pulse transformer replacement
- 计算机外围接口 Computer peripheral interface

4. 功能图 Functional Diagram

Schematic



引脚配置 Pin Configuration

1. 阳极 Anode
3. 阴极 Cathode
4. 接地 GND
5. 输出电压 V_{out}
6. 电源电压 V_{CC}

Truth Table

Input	Output
H	L
L	H

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
	反向电压 Reverse voltage	V_R	5	V
	功耗 Power dissipation (T_A = 25°C)	P_D	100	mW
输出 Output	功耗 Power dissipation (T_A = 25°C)	P_C	85	mW
	输出电流 Output current	I_O	50	mA
	输出电压 Output voltage	V_O	7.0	V
	工作电压 Supply voltage	V_{CC}	7.0	V
输出功率 Output Power Dissipation		P_O	85	mW
隔离电压 (1*) Isolation Voltage		V_{iso}	3750	Vrms
工作温度 Operating temperature		T_{OPR}	-40 to +85	℃
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, 相对湿度在40~60%RH环境下, 隔离电压测试时, 1&3脚短接在一起, 4、5&6脚短接在一起
AC for 1 minute, R.H.= 40 ~ 60% R.H. In this test, pins 1&3 are shorted together, and pins 4, 5&6 are shorted together.

2* 焊接时间为10秒 Soldering time is 10 seconds

6. 电气特性(Ta=-40至85℃,除非另有规定)

Electrical Characteristics(Ta=-40 to 85℃ 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	-	1.45	1.8	V	I_F=10mA
	反向电压 Reverse voltage	V_R	5.0	-	-	V	I_R=10μA T_A=25°C
	正向电压温度系数 Temperature coefficient of forward voltage	V_F/T_A	-	-1.9	-	mV/℃	I_F=10mA
	输入电容 Input capacitance	C_{IN}	-	70	-	pF	V_F=0, f=1MHz
输出 Output	高电平工作电流 High level supply current	I_{CCH}	-	6	9	mA	I_F=0mA, V_{CC}=5.5V
	低电平工作电流 Low level supply current	I_{CCL}	-	7.5	10	mA	I_F=10mA, V_{CC}=5.5V

• 传输特性 Transfer Characteristics

参数 Parameter	符号 Symbol	最小值 Min.	规格值 Typ.*	最大值 Max.	单位 Unit	条件 Condition
高电平输出电流 HIGH Level Output Current	I_{OH}	-	2.1	30	μA	V_{CC}=5.5V V_O=5.5V I_F=250μA
低电平输出电压 LOW Level Output Current	V_{OL}	-	0.4	0.6	V	V_{CC} = 5.5V I_F=5mA I_{OL}(Sinking)=13mA
输入阈值电流 Input Threshold Current	I_{FT}	-	2.4	5	mA	V_{CC}= 5.5V, V_O=0.6V I_{OL}(Sinking)=13mA

开关特性(Ta=-40至85℃, V_{CC}=5V, I_F=7.5mA除非另有说明)

Switching Characteristics (Ta=-40 to 85°C, V_{CC}=5V, I_F=7.5mA 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
逻辑低电平的传播延迟时间(3*) Propagation Delay Time to Logic Low (Fig.10)		T_{PHL}	-	41	100	ns	C_L=15Pf R_L=350Ω, T_A=25°C
逻辑高电平的传播延迟时间(3*) Propagation Delay Time to Logic High (Fig.10)		T_{PLH}	-	50	100	ns	C_L=15pF R_L=350Ω, T_A=25°C
脉冲宽度失真 Pulse width distortion		$\|T_{PHL}-T_{PLH}\|$	-	9	35	ns	C_L=15pF, R_L=350Ω
传播延迟偏差(5*) Propagation Delay Skew		t_{PSK}	-	-	40	ns	C_L=15pF, R_L=350Ω
输出上升时间 Output rise time (Fig.10)		tr	-	40	-	ns	C_L=15pF, R_L=350Ω
输出下降时间 Output fall time (Fig.10)		tf	-	10	-	ns	C_L=15pF, R_L=350Ω
逻辑高电平时的共模瞬态抗扰度(6*) Common Mode Transient Immunity at Logic High (Fig.9)	KLM600	CM_H	-	-	-	V/us	I_F = 7.5mA,V_{OH}=2.0V, V_{CM}=10Vp-p, R_L=350Ω, T_A =25°C
	KLM601		5000	-	-		I_F = 7.5mA,V_{OH}=2.0V, V_{CM}=50Vp-p, R_L=350Ω, T_A =25°C
	KLM611		20000	-	-		I_F = 7.5mA,V_{OH}=2.0V, V_{CM}=1000Vp-p, R_L=350Ω, T_A =25°C
逻辑低电平时的共模瞬态抗扰度(7*) Common Mode Transient Immunity at Logic Low (Fig.9)	KLM600	CM_L	-	-	-	V/us	I_F = 0mA, V_{OL}=0.8V, V_{CM}=10Vp-p, R_L=350Ω, T_A =25°C
	KLM601		5000	-	-		I_F = 0mA, V_{OL}=0.8V, V_{CM}=50Vp-p, R_L=350Ω, T_A =25°C
	KLM611		20000	-	-		I_F = 0mA, V_{OL}=0.8V, V_{CM}=1000Vp-p, R_L=350Ω, T_A =25°C

* Ta = 25°C 时的规格值，V_{CC}=5V Typical values at Ta = 25°C,V_{CC}=5V

7. 特性曲线 Characteristic Curves

图1. 正向电流 vs 正向电压的关系

Figure 1. Forward Current vs Forward Voltage

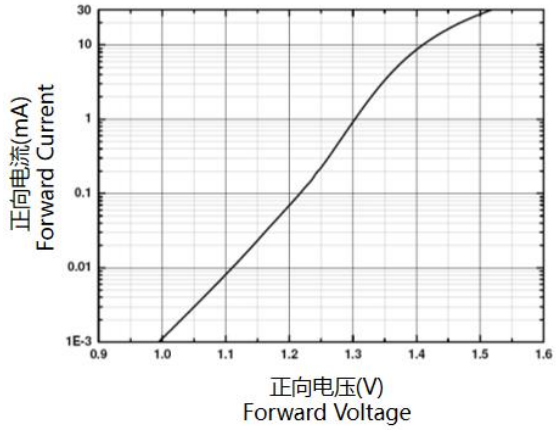


图2 低电平输出电压 vs 环境温度的关系

Fig.2 Low level output voltage vs ambient temperature

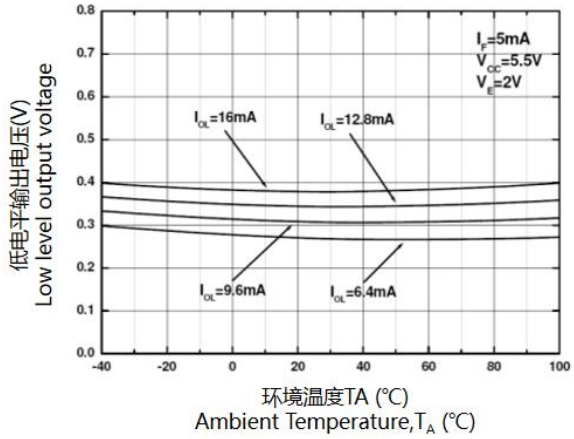


图3. 低电平输出电流 vs 环境温度的关系

Figure 3. Low level output current vs Ambient Temperature

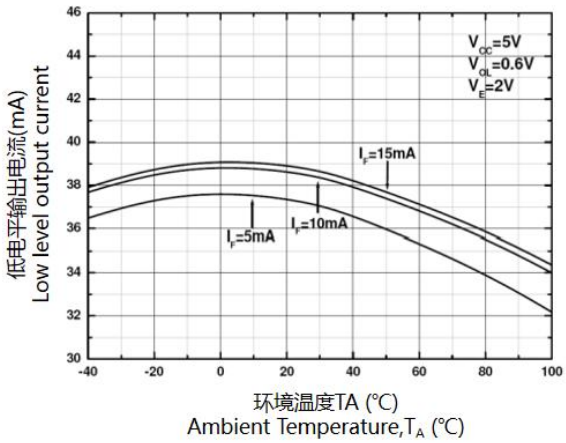


图4. 输入阈值电流 vs 环境温度的关系

Figure 4. Input threshold current Vs Ambient Temperature

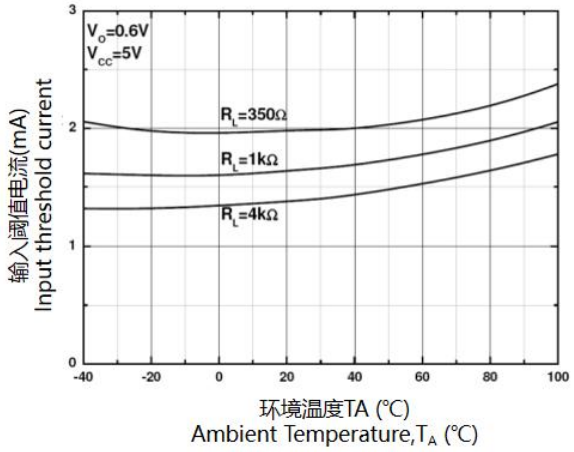


图5. 输出电压 vs 输入电流的关系

Figure 5. Output Voltage vs Input current

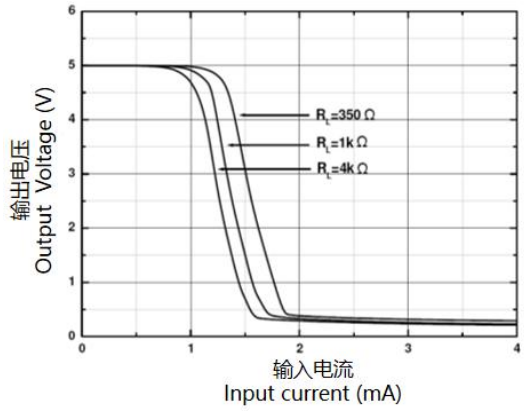


图6. 逻辑高电平输出电流 vs 环境温度的关系

Figure 6. Logic high output current vs Ambient Temperature

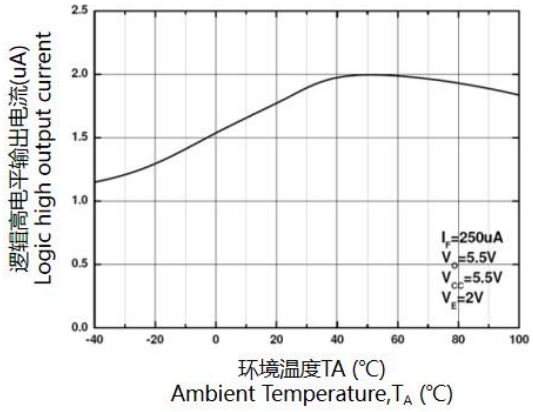


图7. 传播延迟 vs 温度的关系

Figure 7. Propagation Delay vs Temperature

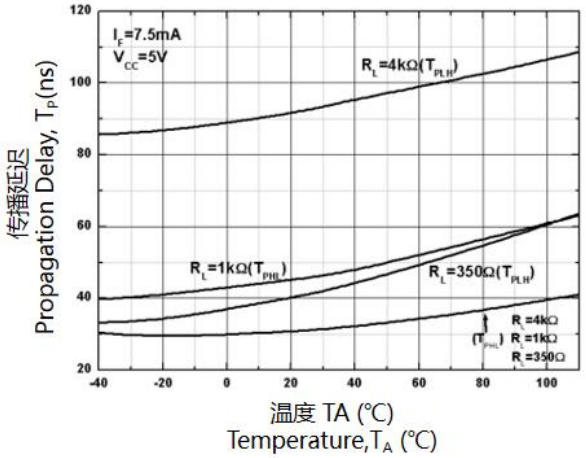


图8. 脉冲宽度失真 vs 温度的关系

Figure 8. Pulse Width Distortion vs Temperature

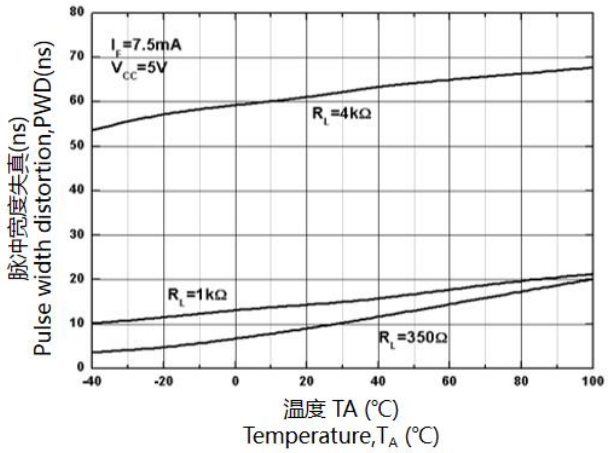


图9. 上升和下降时间 vs温度的关系

Figure 9. Rise and Fall Time vs Temperature

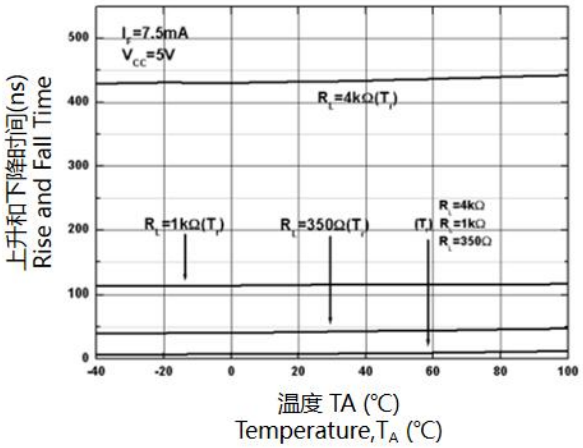


Figure 10. tPHL, tPLH, tr 和 tf的测试电路和波形 Test circuit and waveforms for tPHL, tPLH, tr and tf

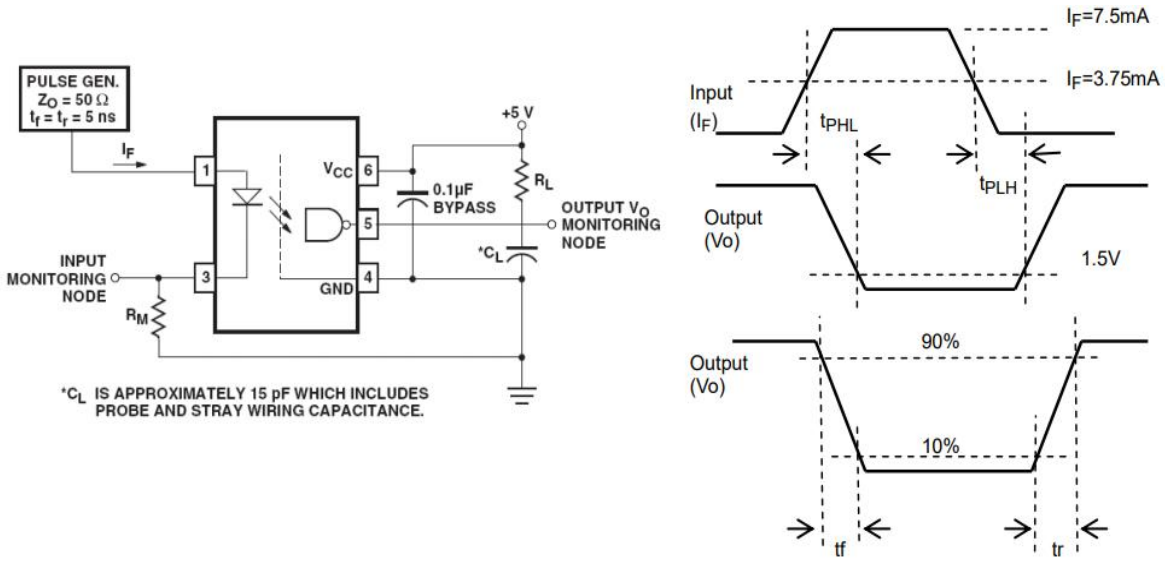
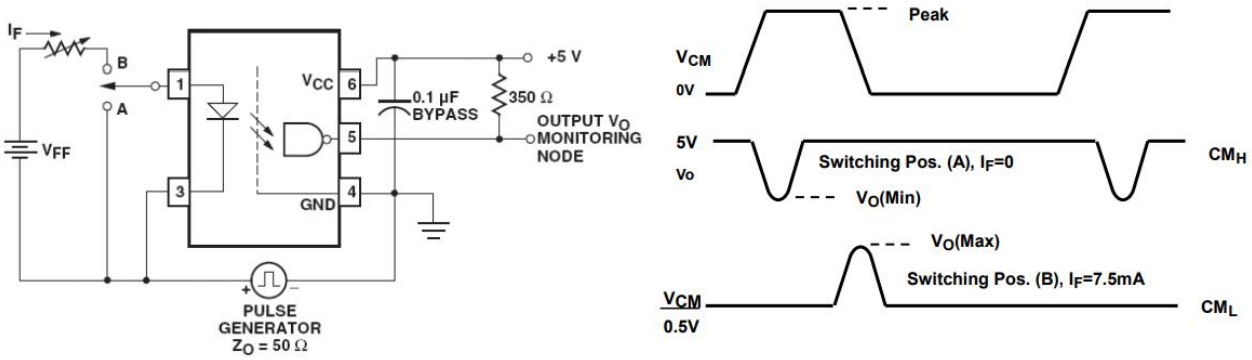


图11.测试电路共模瞬态抗扰度 Test circuit Common mode Transient Immunity



*3 t_{PLH}-传播延迟是从输入电流脉冲从高电平到低电平转换时的 3.75mA 电平到输出电压脉冲从低电平到高电平转换时的 1.5 V 电平之间测量的

t_{PLH}-Propagation delay is measured from the 3.75mA level on the HIGH to LOW transition of the input current pulse to the 1.5 V level on the LOW to HIGH transition of the output voltage pulse

*4.t_{PHL}-传播延迟是从输入电流脉冲低电平到高电平转换时的 3.75mA 电平到输出电压脉冲高电平到低电平转换时的 1.5 V 电平之间测量的

t_{PHL}–Propagation delay is measured from the 3.75mA level on the LOW to HIGH transition of the input current pulse to the 1.5 V level on the HIGH to LOW transition of the output voltage pulse.

*5.t_{PSK} 等于在任何给定温度下，在最恶劣工作条件范围内各单元之间出现的 t_{pHL} 和/或 t_{pLH} 的最恶劣差值。

t_{PSK} is equal to the magnitude of the worst case difference in t_{pHL} and/or t_{pLH} that will be seen between units at any given temperaturewithin the worst Case operating condition range.

*6.CMH-为确保输出保持在高电平状态（即 VOUT > 2.0V），共模电压的最大可容许上升率

CMH-The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the HIGH state (i.e., VOUT > 2.0V)

*7.CML-为确保输出保持在低电平输出状态（即 VOUT < 0.8V），共模电压的最大可容许上升率

CML-The maximum tolerable rate of rise of the common mode voltage to ensure the output will remain in the LOW output state (i.e., VOUT < 0.8V)

8. 订单信息 Order Information

• 材料编号 Part Number

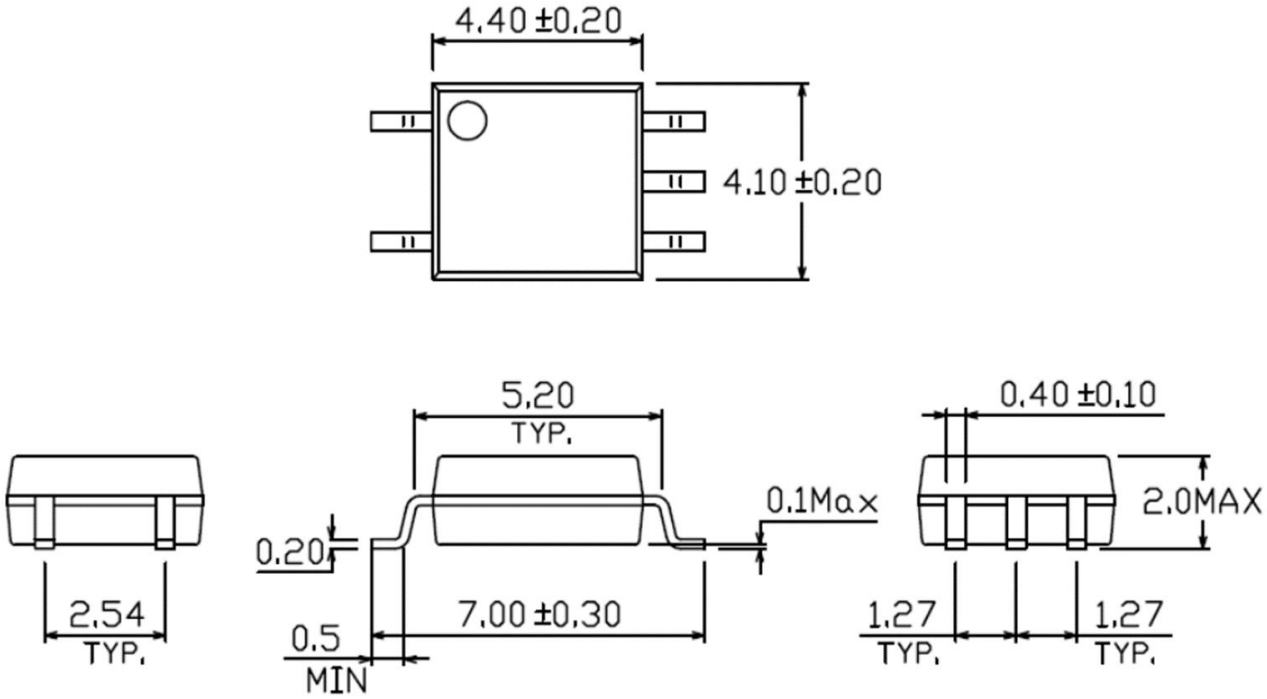
KLM6XX-Z-V-T04

附注(Notes):

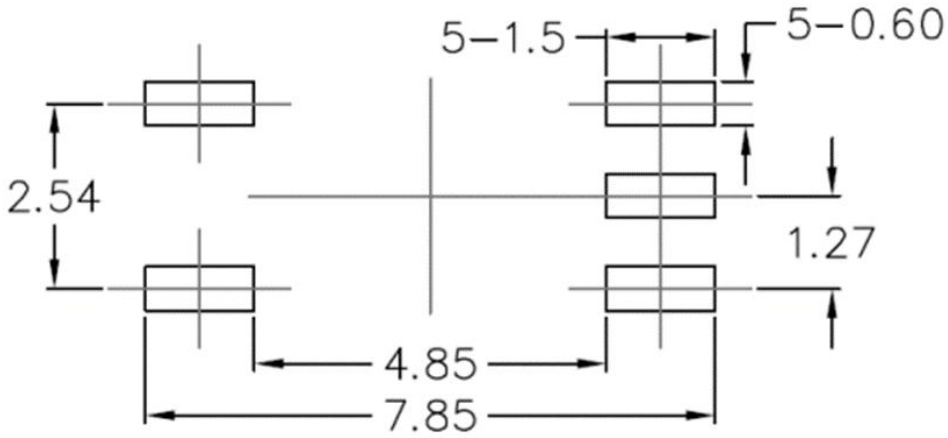
XX =零件编号(00, 01或11) Part No. (00, 01 or 11)
Z = 料带和卷轴选项(TA或TB)
Tape and reel option (TA or TB)
V = 表示VDE标识(客户指定镭射字符才加"V")
VDE (Only add "V" to laser characters specified by the customer)
T04 = 表示包装数量 Packaging Quantity

选项 Option	描述 Description	包装数量 Packing quantity
TA-T04	表面贴装引线形式+TA载带和卷轴选项 Surface mount lead form + TA tape & reel option	每卷3500pcs 3000 units per reel
TB-T04	表面贴装引线形式+TB载带和卷轴选项 Surface mount lead form + TB tape & reel option	每卷3500pcs 3000 units per reel
/	内盒装：每盒3盘 Inner box packaging：3reels/box	每盒10500pcs 10500pcs per box
/	每箱装：10个内盒 Pack per Carton: 10inner boxes	每箱105000pcs 105000pcs 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

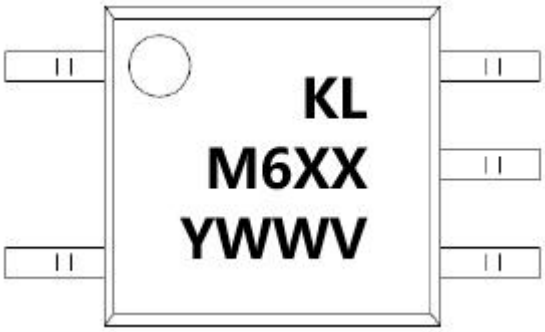


备注 Notes

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

M6XX = 表示材料部件号 Denotes Device Part Number
X表示零件编号(00, 01或11) Part No. (00, 01 or 11)

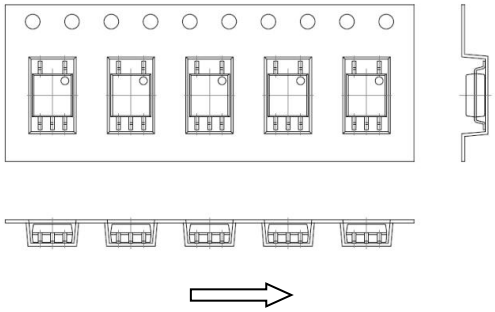
Y = 表示1位年份代码Denotes 1 digit Year code

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)

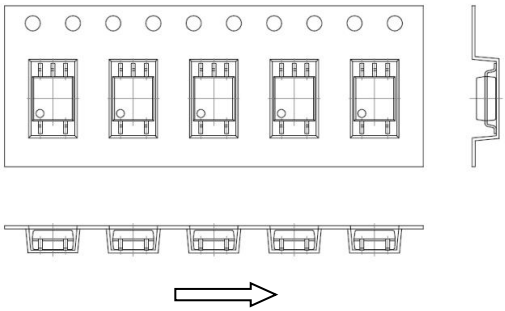
11.料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



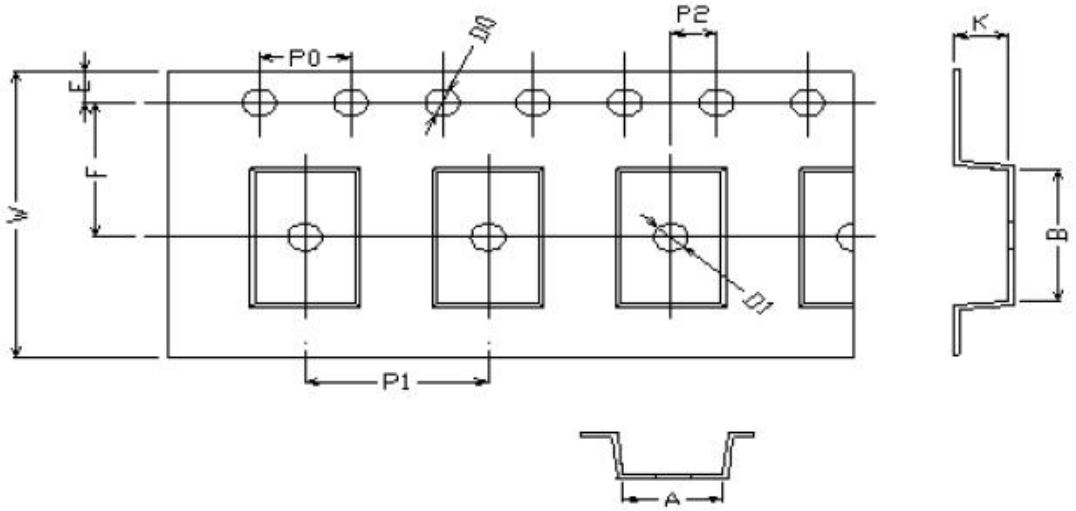
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

料带尺寸Material belt size



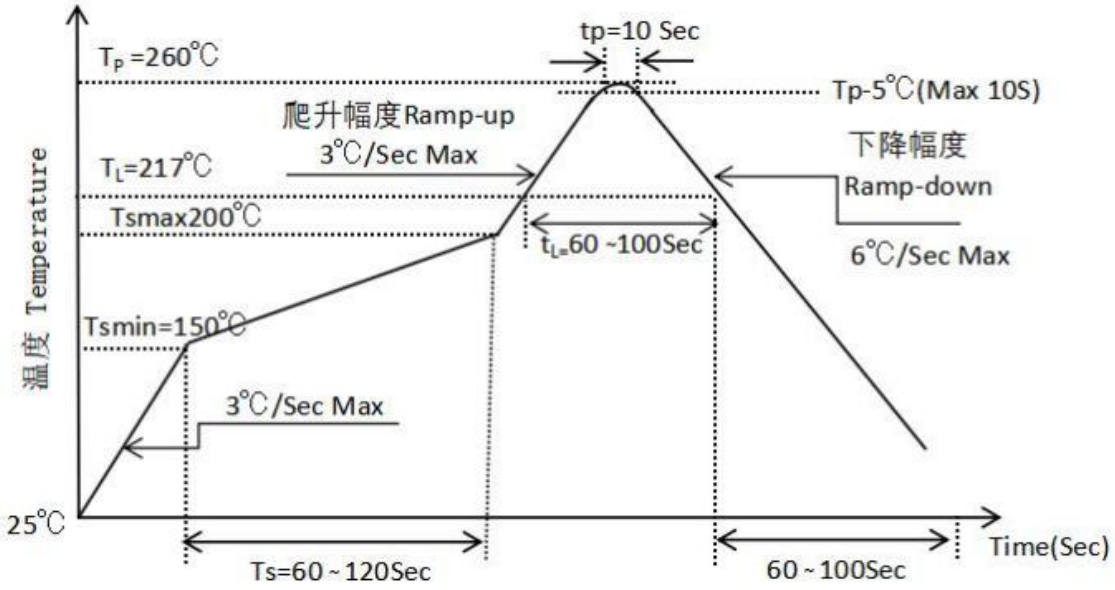
尺寸编号 Dimension No.	A	B	D0	D1	E	F
尺寸(mm) Dimension(mm)	4.4±0.1	7.6±0.1	1.5±0.1	1.5±0.1	1.75±0.1	7.5±0.1
尺寸编号 Dimension No.	P0	P1	P2	t	W	K
尺寸(mm) Dimension(mm)	4.0±0.15	8.0±0.1	2.0±0.1	0.3±0.1	16.0±0.2	2.4±0.1

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	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	-	10	s
降温速率 Ramp-down Rate(T_P to T_L)	-	-	6	℃/s