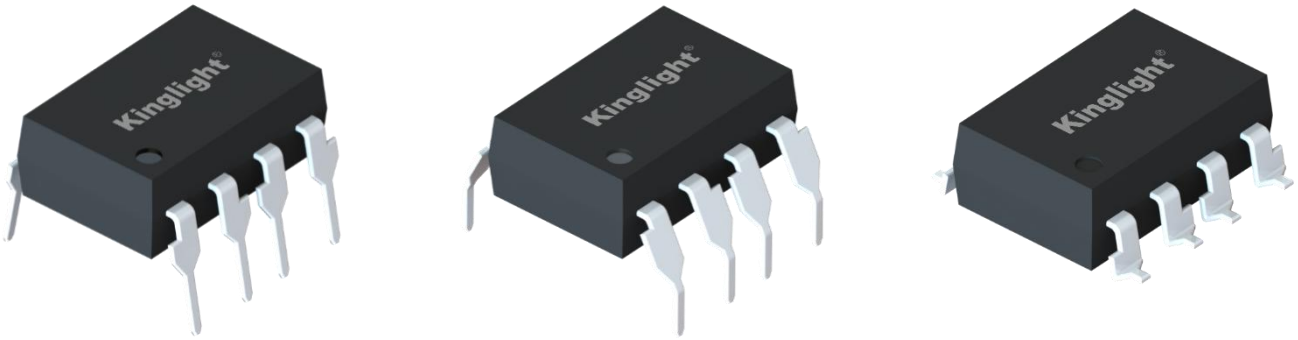
KL6N138, KL6N139 DIP8 LOW INPUT CURRENT HIGH GAIN SPLIT DARLINGTON PHOTOCOUPLER

DIP8低输入电流高增益分离达林顿光耦合器



＊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.
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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.
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＊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.
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1. 产品特点 Product features

- 高电流传输比-规格值2000% High current transfer ratio–2000% typical
- 可保证在 0 至 70℃ 温度范围内运行 Guaranteed performance from 0 to 70℃
- 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)
- 无卤素 (溴<900ppm, 氯<900ppm, 溴+氯<1500ppm)
  Halogens free (Br < 900ppm, Cl < 900ppm, Br+Cl < 1500ppm)
- 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:CQC23001408000) CQC approved (No.CQC23001408000)
  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

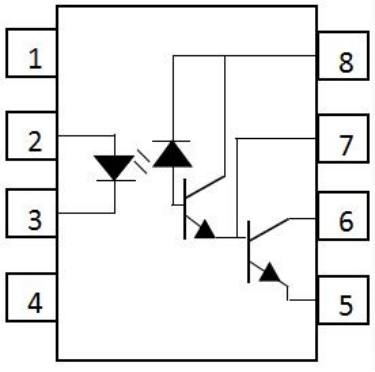
- KL6N138和KL6N139器件各由一个红外发射二极管组成，通过光学耦合到 一个高增益分离达林顿照片探测器 它们提供输入和输出之间极高的电流传输比，并通过一个基本终端来调整增益带宽。
  The KL6N138 and KL6N139 devices each consist of an infrared emitting diode, optically coupled to a high gain split Darlington photo detector. They provide extremely high current transfer ratio between input and output, with access to a base terminal to adjust the gain bandwidth.
- 它们采用 8 引脚 DIP 封装，有宽引线间距和 SMD 两种选择
  They are packaged in an 8-pin DIP package and available in wide-lead spacing and SMD options

3. 产品应用 Product Applications

- 电流回路接收机 Current loop receiver
- 微处理器总线隔离 Microprocessor bus isolation
- 数字逻辑接地隔离 Digital logic ground isolation
- 低输入电流线路接收器 Low input current line receiver
- RS-232C线路接收机 RS-232C line receiver

4. 功能图 Functional Diagram

Schematic 示意图



引脚配置 Pin Configuration

1. 无连线No Connection
2. 阳极Anode
3. 阴极Cathode
4. 无连线No Connection
5. 接地 GND
6. 输出电压V_{out}
7. 基极电压V_B
8. 工作电压V_{CC}

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	20	mA
	峰值正向电流（50% 占空比，1 ms P.W） Peak forward current(50% duty, 1ms P.W)		I_{FP}	40	mA
	峰值瞬态电流（≤1μs P.W,300pps） Peak transient current(≤1μs P.W,300pps)		I_{Ftrans}	1	A
	反向电压 Reverse voltage		V_R	5	V
	功耗 Power dissipation		P_{IN}	45	mW
输出 Output	功耗 Power dissipation		P_O	100	mW
	发射极-基极反向电压 Emitter-Base reverse voltage		V_{ER}	0.5	V
	输出电流 Output current		I_O	60	mA
	输出电压 Output voltage	KL6N138	V_O	-0.5 ~ 7	V
		KL6N139		-0.5 ~ 18	
	工作电压 Supply voltage	KL6N138	V_{CC}	-0.5 ~ 7	V
		KL6N139		-0.5 ~ 18	
隔离电压（1*）Isolation Voltage			V_{ISO}	5000	V rms
工作温度 Operating temperature			T_{OPR}	-40 ~ +85	℃
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、7&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, 7, 8 are shorted together.

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

6. 电气特性(Ta=0至70℃,除非另有规定)

Electrical Characteristics(Ta=0 to 70℃ 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	-	1.3	1.7	V	I_F=1.6mA
	反向电压 Reverse voltage		V_R	5.0	-	-	V	I_R=10μA T_A=25℃
	正向电压温度系数 Temperature coefficient of forward voltage		$\Delta V_F/\Delta T_A$	-	-1.8	-	mV/°C	I_F =1.6mA
输出 Output	逻辑高电平工作电流 Logic High Supply Current	KL6N138 KL6N139	I_{CCH}	-	0.05	10	μA	I_F=0mA, V_O=Open V_{CC}=18V
	逻辑低电平工作电流 Logic Low supply current	KL6N138 KL6N139	I_{CCL}	-	0.6	1.5	mA	I_F=1.6mA, V_O=Open, V_{CC}=18V
	逻辑高电平输出电流 Logic High Output Current	KL6N138	I_{OH}	-	0.01	100	μA	I_F=0mA, V_O=V_{CC}=18V
		KL6N139		-	-	250		

• 传输特性 (Ta=0至70℃, V_{CC}=4.5V, 除非另有规定)

Transfer Characteristics (Ta=0 to 70℃, V_{CC}=4.5V 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	KL6N139	CTR	400	2500	-	%	I_F=0.5mA, V_O=0.4V, V_{CC}=4.5V
			500	2000	-		I_F=1.6mA, V_O=0.4V, V_{CC}=4.5V
	KL6N138		300	2000	-		I_F=1.6mA, V_O=0.4V, V_{CC}=4.5V
逻辑低电平输出电压 Logic Low Output Voltage	KL6N139	V_{OL}	-	0.05	0.4	V	I_F=0.5mA, I_O=2mA, V_{CC}=4.5V
			-	0.09	0.4		I_F=1.6mA, I_O=8mA, V_{CC}=4.5V
			-	0.12	0.4		I_F=5mA, I_O=15mA, V_{CC}=4.5V
			-	0.17	0.4		I_F=12mA, I_O=24mA, V_{CC}=4.5V
	KL6N138		-	0.06	0.4		I_F=1.6mA,I_O=4.8mA, V_{CC}=4.5V

• 开关特性(Ta=0至70℃, V_{CC}=5V, 除非另有说明)

Switching Characteristics (Ta=0 to 70°C, V_{CC}=5V 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 Propagation delay time to Logic Low (Fig.13)	KL6N139	T_{PHL}	-	5	25	μs	I_F=0.5mA,R_L=4.7kΩ T_A=25℃
			-	-	30		I_F=0.5mA,R_L=4.7kΩ
			-	0.2	1		I_F=12mA, R_L=270Ω T_A=25℃
			-	-	2		I_F=12mA, R_L=270Ω
	KL6N138		-	1.4	10		I_F=1.6mA,R_L=2.2kΩ T_A=25℃
			-	-	15		I_F=1.6mA,R_L=2.2kΩ
逻辑高电平的传播延迟时间 Propagation delay time to Logic High (Fig.13)	KL6N139	T_{PLH}	-	16	60	μs	I_F=0.5mA,R_L=4.7kΩ T_A=25℃
			-	-	90		I_F=0.5mA,R_L=4.7kΩ
			-	1.7	7		I_F=12mA, R_L=270Ω T_A=25℃
			-	-	10		I_F=12mA, R_L=270Ω
	KL6N138		-	8	35		I_F=1.6mA,R_L=2.2kΩ T_A=25℃
			-	-	50		I_F=1.6mA,R_L=2.2kΩ
逻辑高电平下的共模瞬态抗扰度(3*) Common Mode Transient Immunity at Logic High (Fig.14)		CM_H	1000	-	-	V/μs	I_F=0mA, V_{CM}=10Vp-p R_L=2.2kΩ, T_A=25°C
逻辑低电平下的共模瞬态抗扰度(3*) Common Mode Transient Immunity at Logic Low (Fig.14)		CM_L	1000	-	-	V/μs	I_F=1.6mA, V_{CM}=10Vp-p R_L=2.2kΩ, T_A=25°C

* Ta = 25°C 条件下的规格值

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

Figure 1.Forward Current vs Forward Voltage

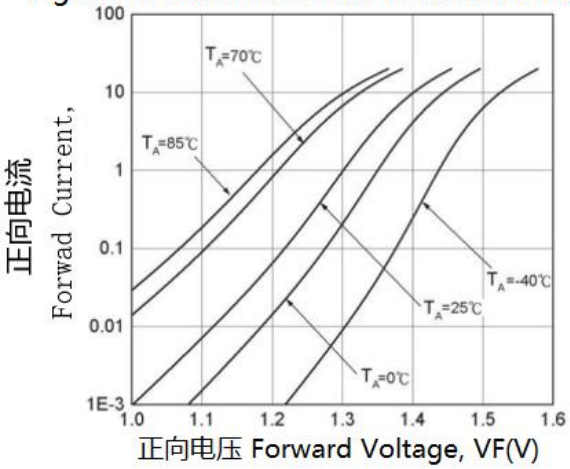


图2.正向电压与环境温度的关系

Figure 2.Forward Voltage vs Temperature

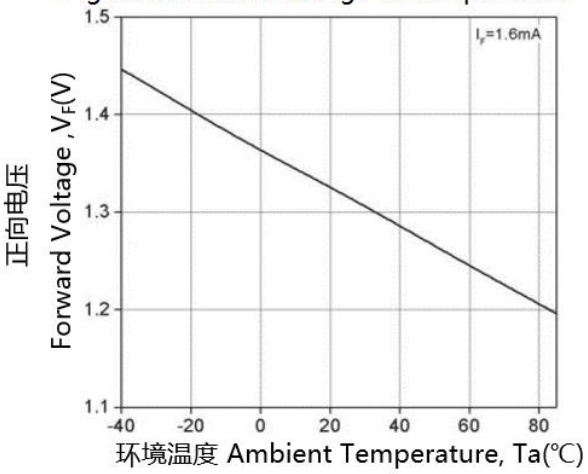


图3.输出电流与输出电压的关系

Figure 3. Output Current vs Output Voltage

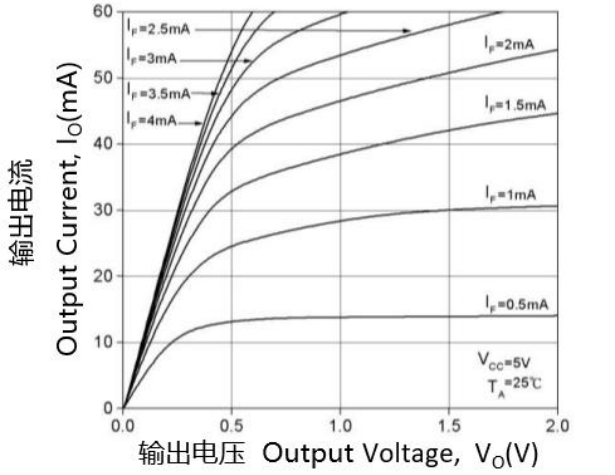


图4.输出电流与输入电流的关系

Figure 4. Output Current vs Input Diode Forward Current

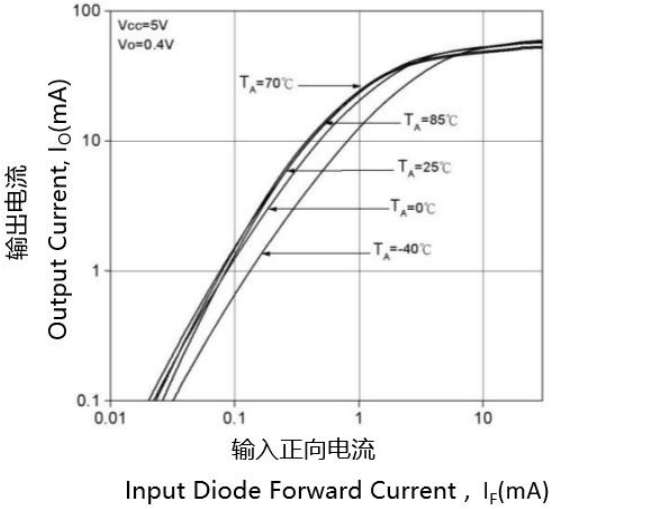


图5.电流传输比与正向电流的关系

Figure 5. Current Transferratio vs Forward Current

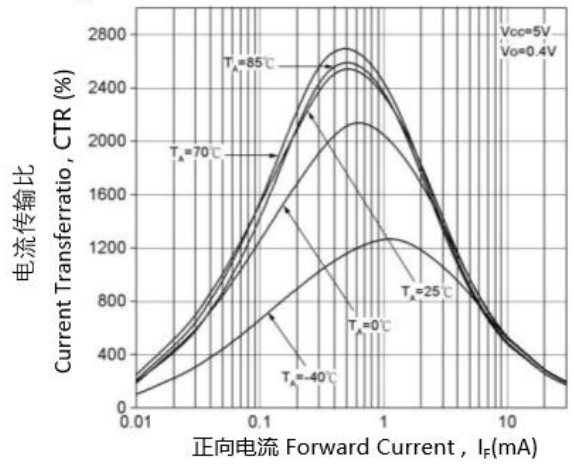


图6.电流传输比与基极-发射极电阻的关系

Figure 6. Current Transferratio vs Base-Emitter Resistance

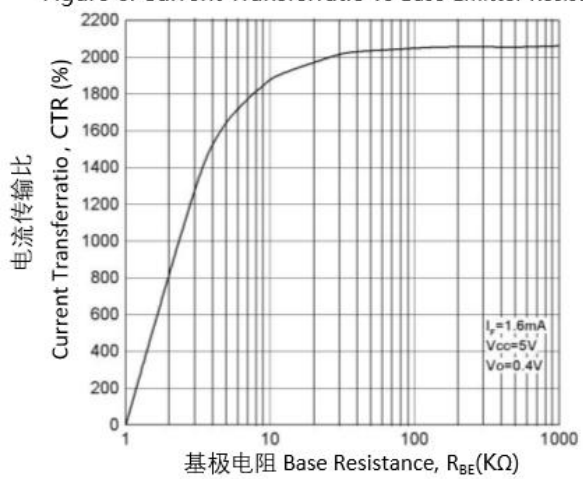


图7.非饱和上升和下降时间时间与负载电阻的关系

Figure 7. Non-saturated Rise nand Fall Time vs Load Resistance

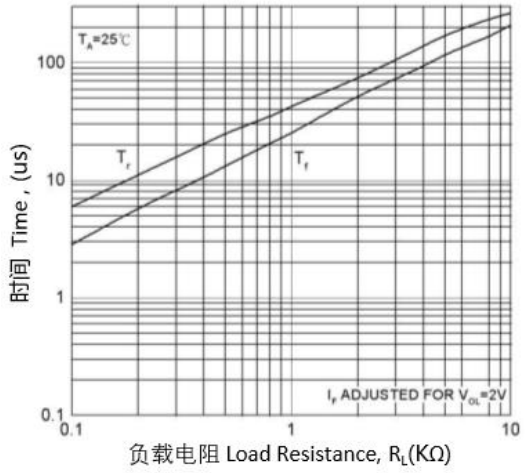


图8.逻辑低电平传输延迟与基极-发射极电阻的关系

Figure 8. Propagavstion Delay To Logic Low vs Base-Emitter Resistance

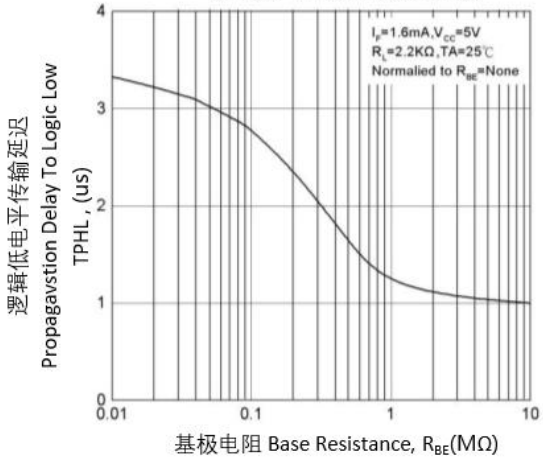


图9.传输延迟与输入正向电流的关系

Figure 9. Propagavstion Delay vs Input Diode Forward Current

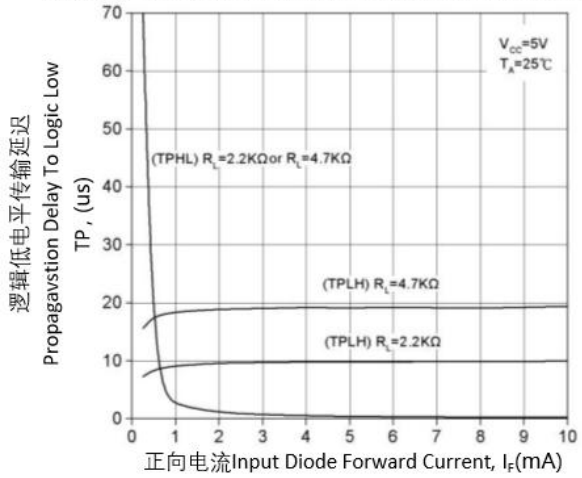


图10.逻辑低电平传输延迟与脉冲的时间的关系

Figure 10. Propagavstion Delay To Logic Low vs Pulse Period

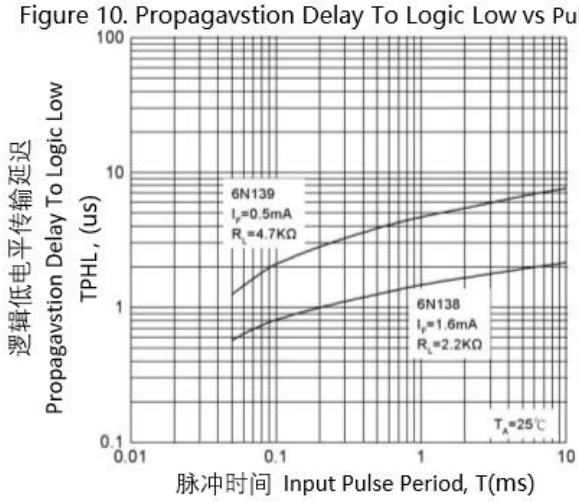


图11.传输延迟与输入温度的关系

Figure 11. Propagavstion Delay vs Temperature

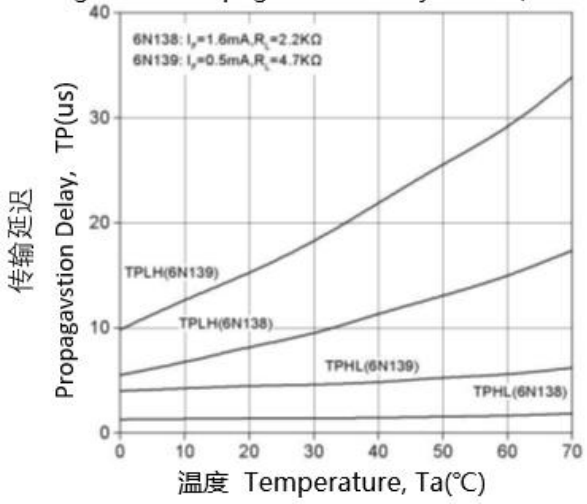


图12.逻辑低电平电流与输入正向电流的关系

Figure 12. Logic Low Supply Current vs Input Diode Forward Current

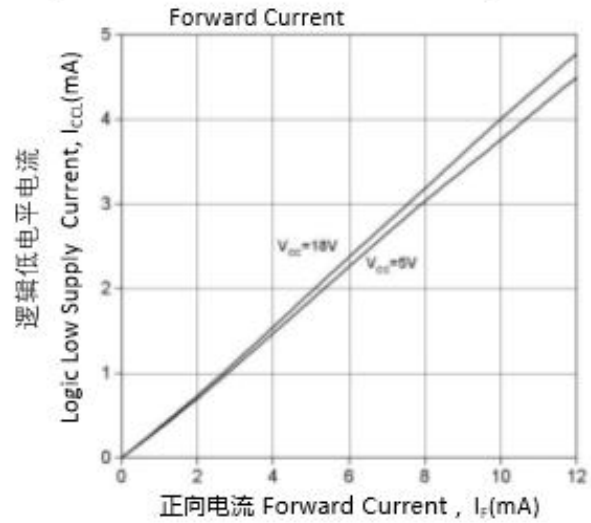


图13. 开关时间测试电路及波形

Figure 13. Switching Time Test Circuit & Waveforms

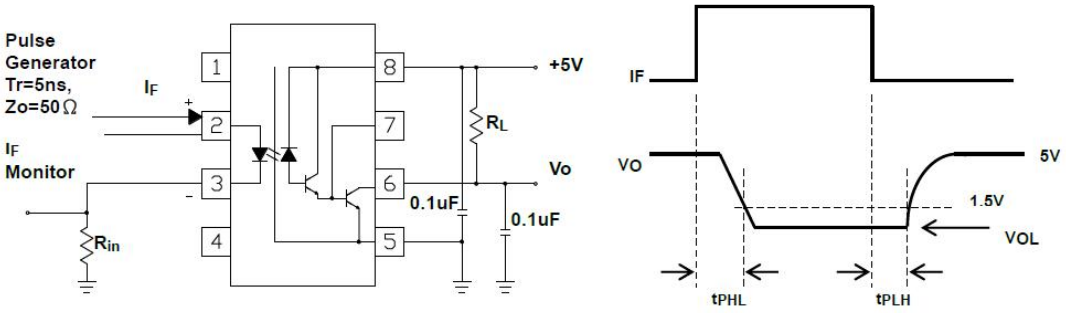
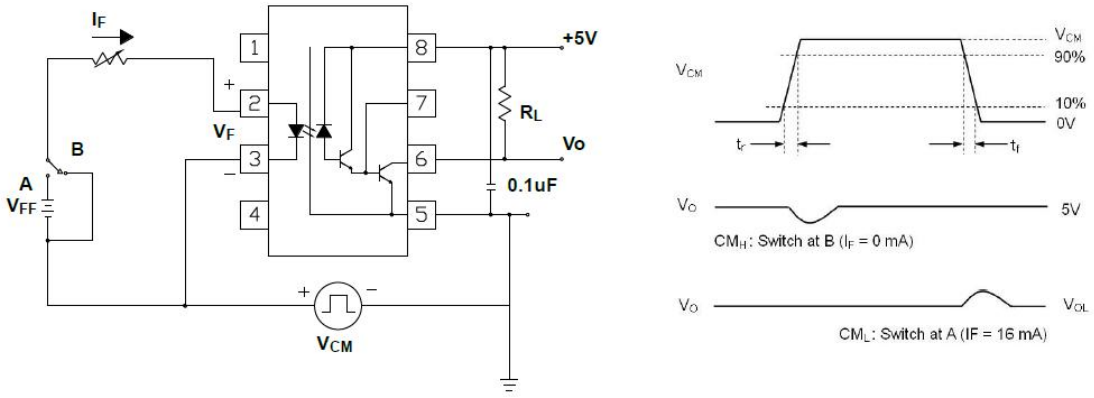


图14. 共模瞬态抗扰度测试电路及波形

Figure 14. Common Mode Transient Immunity Test Circuit & Waveforms



附注 (Notes):

*3逻辑高电平的共模瞬态抗扰度是共模脉冲信号 VCM 前沿的最大可容忍（正）dVcm/dt，以确保输出保持在逻辑高电平状态（即 VO >2.0V）。

*3 Common mode transient immunity in logic high level is the maximum tolerable (positive) dVcm/dt on the leading edge of the common mode pulse signal VCM, to assure that the output will remain in a logic high state (i.e., VO >2.0V).

逻辑低电平的共模瞬态抗扰度是共模脉冲信号 VCM 后沿的最大可容忍（负）dVcm/dt，以确保输出保持在逻辑低电平状态（即 VO <0.8V）

Common mode transient immunity in logic low level is the maximum tolerable (negative) dVcm/dt on the trailing edge of the common mode pulse signal, VCM, to assure that the output will remain in a logic low state (i.e., VO <0.8V).

8. 订单信息 Order Information

• 材料编号 Part Number

KL6N13XY-Z-V

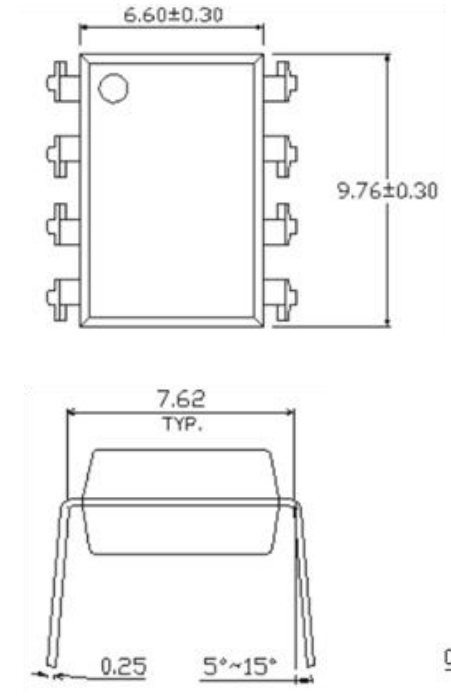
附注(Notes):

X = 零件编号(X=8或9)
Part No. (X = 8 or 9)
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)

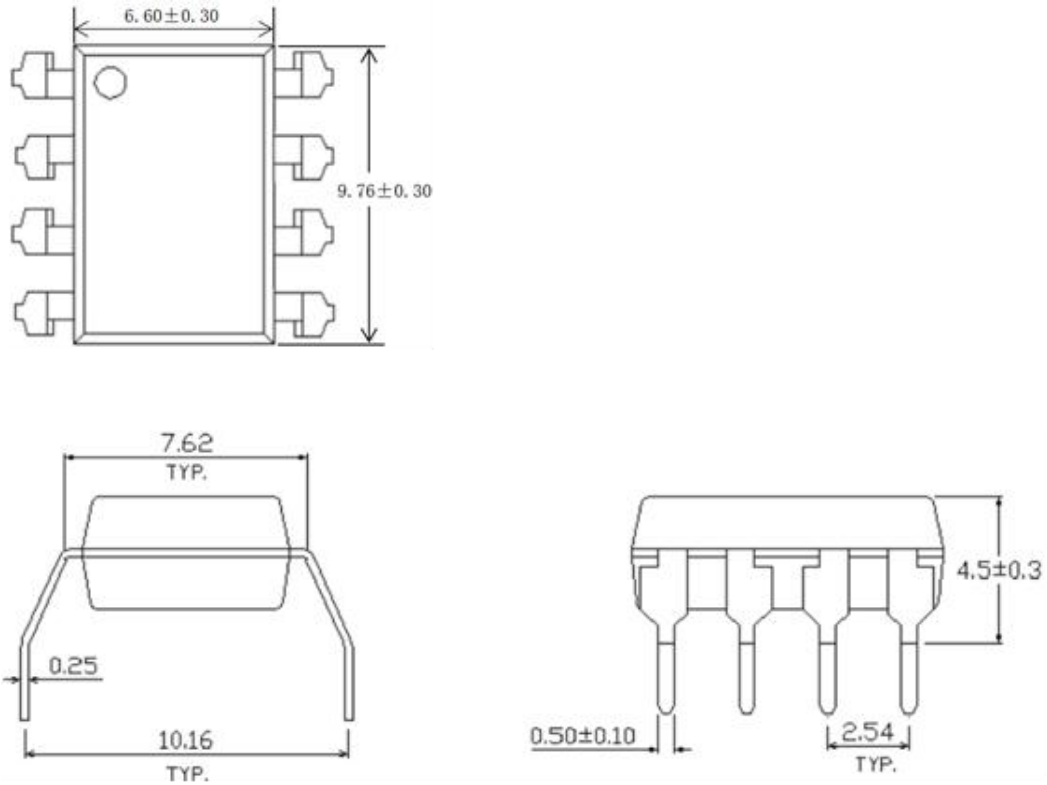
选项 Option	描述 Description	包装数量 Packing quantity
无 None	标准DIP-8 Standard DIP-8	每管45pcs 45 units per tube
M	宽引脚弯曲(0.4英寸间距) Wide lead bend (0.4 inch spacing)	每管45pcs 45 units per tube
S-TA	表面贴装引线形式+TA载带和卷轴选项 Surface mount lead form + TA tape & reel option	每卷1000pcs 1000 units per reel
S-TB	表面贴装引线形式+TB载带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

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

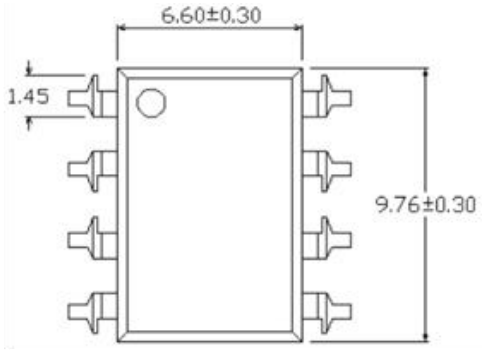
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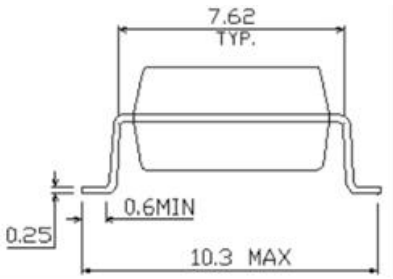


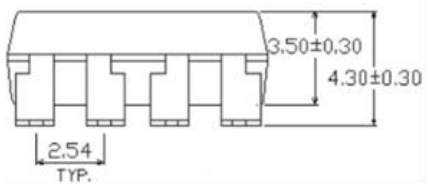
• 选择M型号 Option M Type



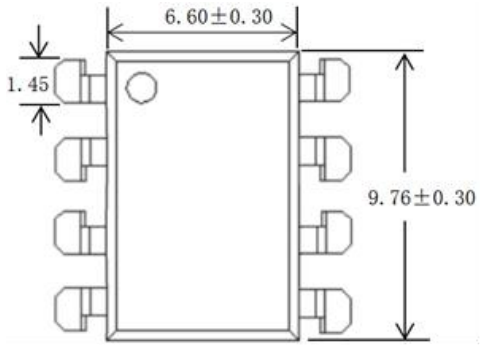
• 选择S型号 Option S Type

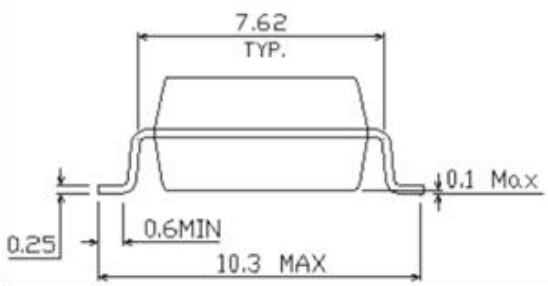


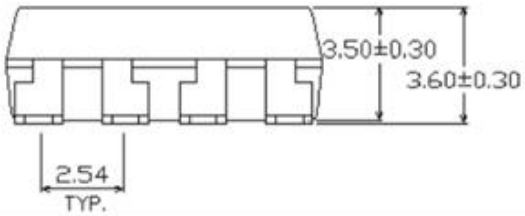




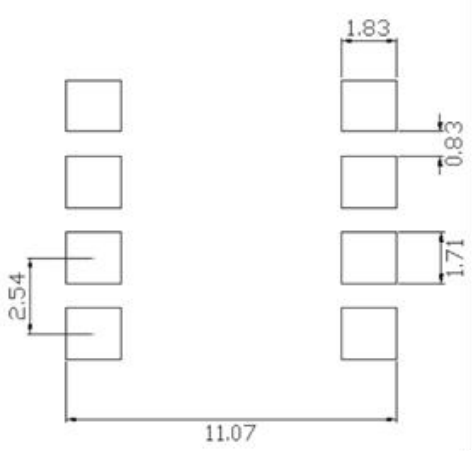
• 选择S1型号 Option S1 Type







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

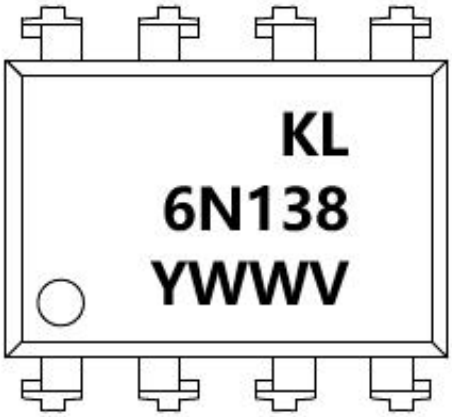


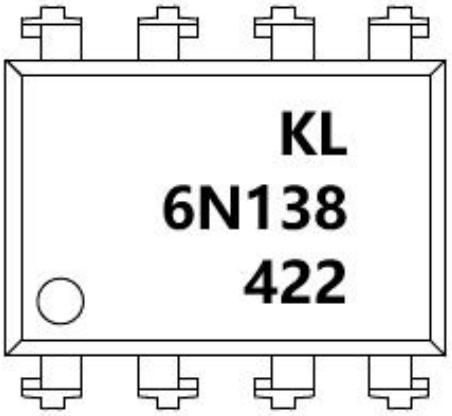
附注 (Notes):

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 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

6N138 = 表示材料部件号 Denotes Device Part Number

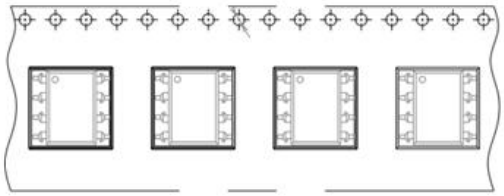
Y = 表示1位年份代码Denotes 1 digit Year code

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)

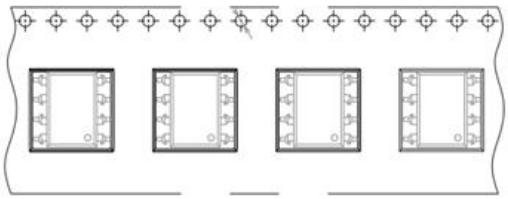
11. 料带和卷轴包装规格 Tape & Reel Packing Specifications

• 选择TA Option TA



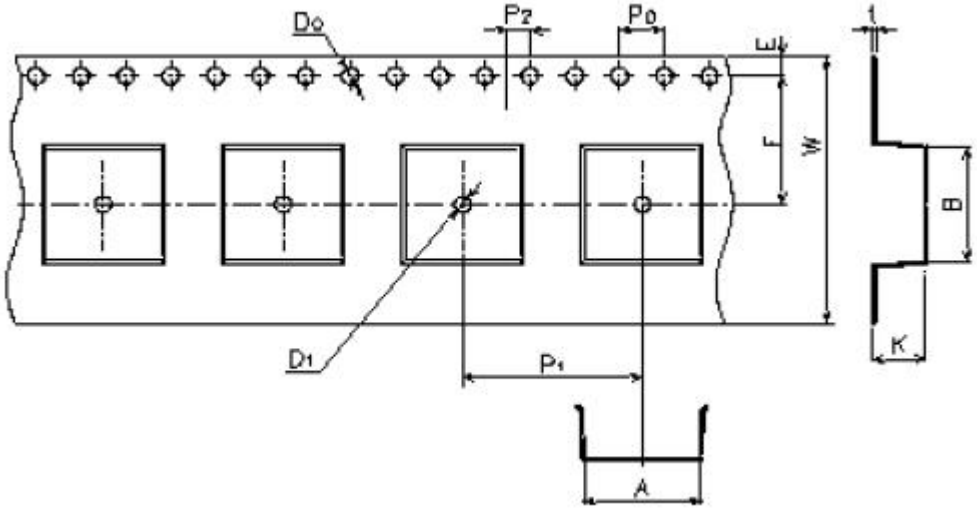
卷轴进给方向 Direction of feed from reel

• 选择TB Option TB



卷轴进给方向 Direction of feed from reel

料带尺寸Material belt size



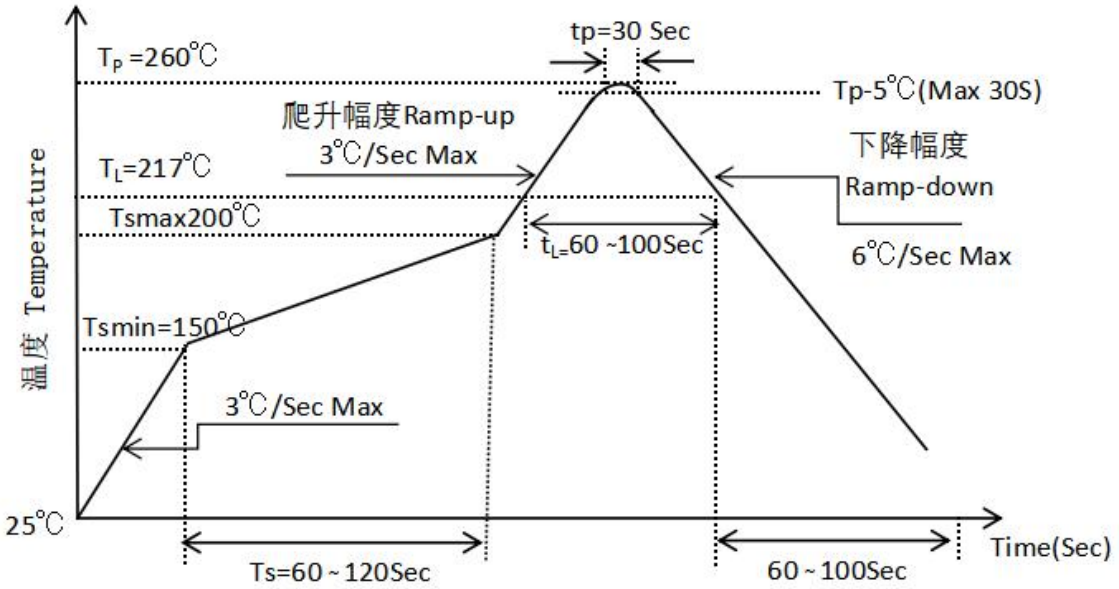
尺寸编号 Dimension No.	A	B	D0	D1	E	F
尺寸(mm) Dimension(mm)	10.4±0.1	10.0±0.1	1.5+0.1/-0	1.5±0.25	1.75±0.1	7.5±0.1
尺寸编号 Dimension No.	P0	P1	P2	t	W	K
尺寸(mm) Dimension(mm)	4.0±0.1	12.0±0.1	2.0±0.05	0.4±0.05	16.0±0.3	4.5±0.1

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.



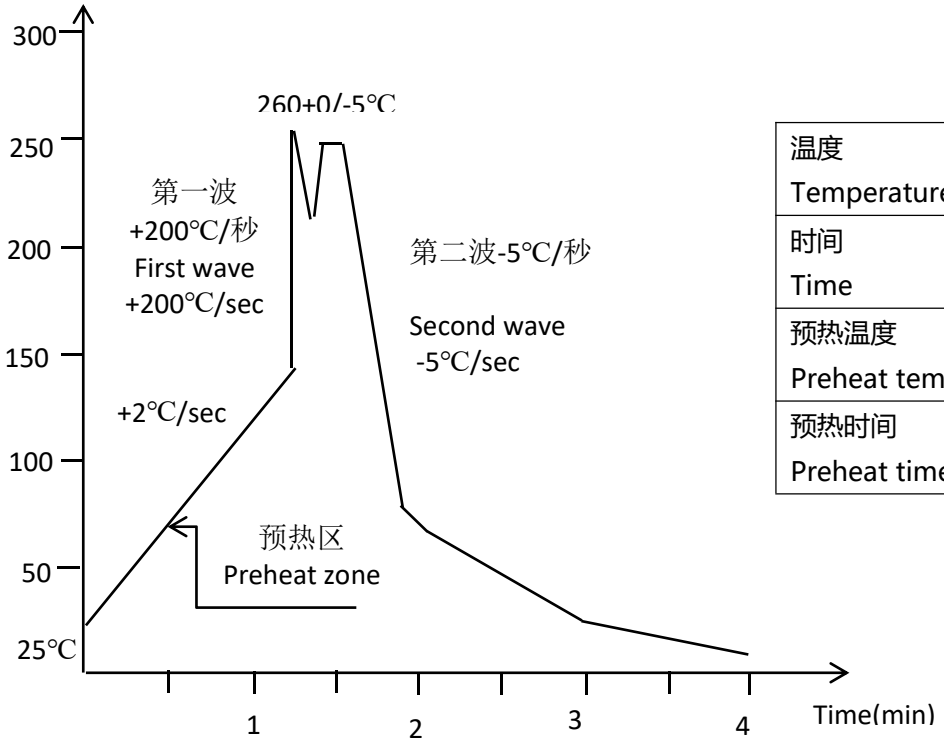
项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	T_s	150	200	℃
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
高于液相线温度(T_L)的时间 Time above Liquidus Temperature T_L	t_L	60	100	s
峰值温度 Peak Temperature	T_P	-	260	℃
T_c 在(T_P-5)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