Photo Transistor

1. 概述 Description

SL3H7X由光电晶体管组成，光学耦合到砷化镓红外发光二极管，封装在SSOP4中，非常小且薄的耦合器。

SL3H7X is composed of phototransistors, optically coupled to gallium arsenide infrared light-emitting diodes, packaged in SSOP4 as a very small and thin coupler.

2. 特性 Features

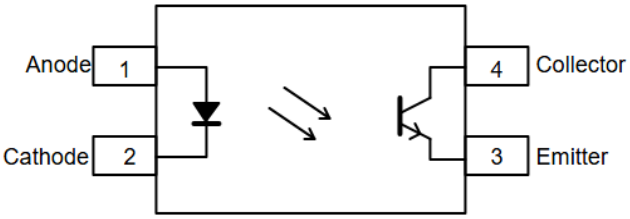
- 电流转换比(CTR)范围: ≥80% (I_F=5mA, V_{CE}=5V, Ta=25℃)
  Current transfer ratio: ≥80% (I_F=5mA, V_{CE}=5V, Ta=25℃)
- 输入-输出隔离电压 (V_{ISO}=3750 Vrms)
  High isolation voltage between input and output(V_{ISO}=3750 Vrms)
- 集电极-发射极击穿电压 BV_{CEO}≥80V
  Collector - emitter breakdown voltage BV_{CEO}≥80V
- 工作温度: -55℃~110℃
  Operating Temperature: -55℃~110℃

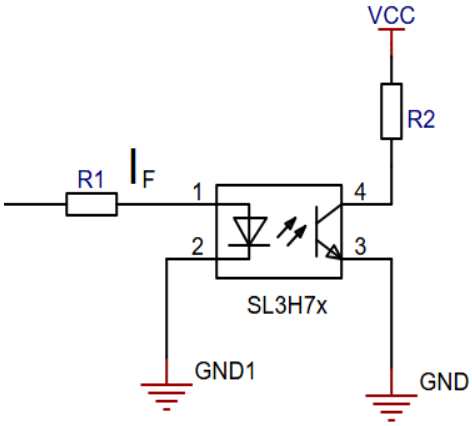
3. 应用 Applications

- 开关电源，智能电表
  Switching power supply, intelligent meter
- 工业控制，测量仪器
  Industrial control, measuring instruments
- 办公设备，比如复印机
  Office equipment such as copiers
- 家用电器，比如空调、风扇、热水器等
  Household appliances: such as air conditioners, fans, water heaters, etc.

4. 封装和原理图 Package and Schematic Diagram

SSOP4





5. 真值表 Truth Table (Positive Logic)

LED	VO
ON	LOW
OFF	HIGH

6. 极限参数 Absolute Maximum Ratings (Ta=25℃)

参数 Parameter		符号 Symbol	额定值 Rating	单位 Unit
发射端 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}	1000	mA
	反向电压 Reverse Voltage	V_R	6	V
	功耗 Power Dissipation	P_D	70	mW
	额定值降低因子(在 Ta = 90°C 以上) Power dissipation Derating factor (above Ta = 90°C)	P_{DD}	2.0	mW/°C
接收端 output	集电极功耗 Collector Power Dissipation	P_C	150	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 Power Dissipation		Ptot	200	mW
隔离电压 Isolation Voltage		Viso	3750	Vrms
工作温度 Operating Temperature		T_{opr}	-55~+110	℃
存储温度 Storage Temperature		T_{stg}	-55~+125	℃
焊接温度 Soldering Temperature		T_{sol}	260	℃

7. 产品特性参数 Electro-optical Characteristics (Ta=25℃)

参数 Parameter		符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
发射端 Input	正向电压 Forward Voltage	V_F	I_F=20mA	-	1.2	1.4	V
	反向电流 Reverse Current	I_R	V_R=4V	-	-	10	μA
	输入电容 Terminal Capacitance	C_t	V=0, F=1KHz	-	30	250	pF
接收端 Output	集电极暗电流 Collector Dark Current	I_{CEO}	V_{CE}=20V, I_F=0	-	-	100	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C=0.1mA, I_F=0	80	-	-	V
	发射极-集电极电压 Emitter-Collector Voltage	BV_{ECO}	I_E=0.01mA, I_F=0	7	-	-	V
传输特性 Transfer Characteristics	电流传输比 Current Transfer Ratio	CTR*	I_F=5mA ,V_{CE}=5V	80	-	600	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_F=10mA,I_C=1mA	-	0.1	0.2	V
	隔离电阻 Isolation Resistance	R_{ISO}	V_{I-O}=DC500V 40~60%R.H.	$5x10^{10}$	$1x10^{11}$	-	Ω
	隔离电容 Isolation capacitance	C_{ISO}	V=0,F=1MHz	-	0.3	1.0	pF
	上升时间 Rise Time	T_r	V_{CE}=2V, I_C=2mA, R_L=100Ω	-	3	18	μs
	下降时间 Fall Time	T_f		-	2	18	μs
	导通时间 Turn on time	Ton		-	5	-	μs
	关断时间 Turn off time	Toff		-	3	-	μs

注*：电流传输比=I_C/I_F x 100%。

Note*：CTR=I_C/I_F x 100%.

8. 电流传输比分档表 CTR Classification Table (I_F=5mA, V_{CE}=5V, Ta=25℃)

代码 Code	最小值 Min.	最大值 Max.
None	80	600
A	80	160
B	130	260
C	200	400
D	300	600

9. 典型光电特性曲线 Typical Electro-Optical Characteristics Curves

Fig.1 Collector Dark Current vs Ambient Temperature

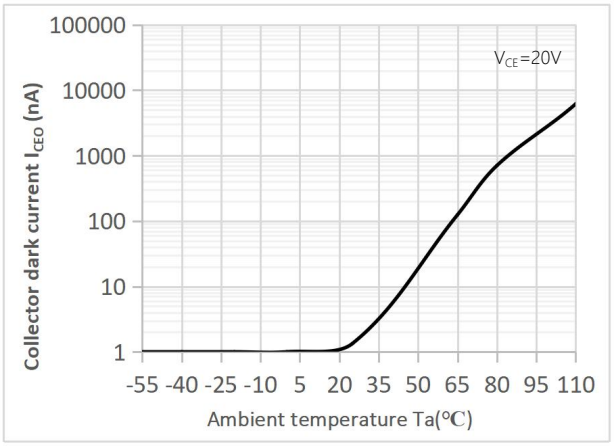


Fig.2 Collector-emitter Saturation Voltage vs. Ambient Temperature

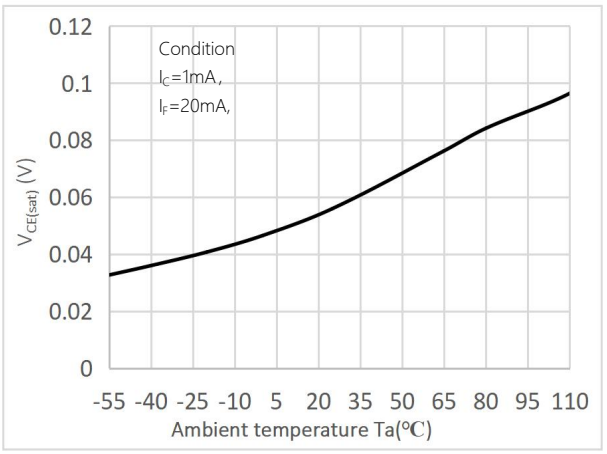


Fig.3 Relative Current Transfer Ratio vs. Ambient Temperature

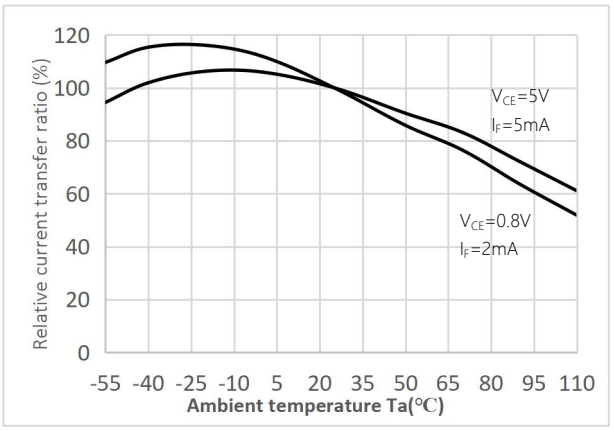


Fig.4 Collector Current vs. Collector-emitter Voltage

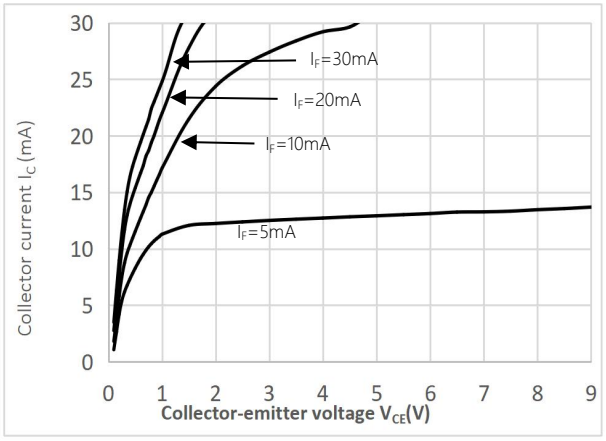


Fig.5 Forward Current vs. Forward Voltage

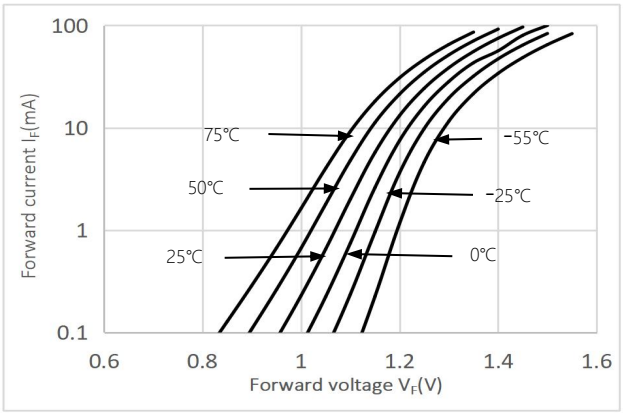


Fig.6 Relative Current Transfer Ratio vs. Forward Current

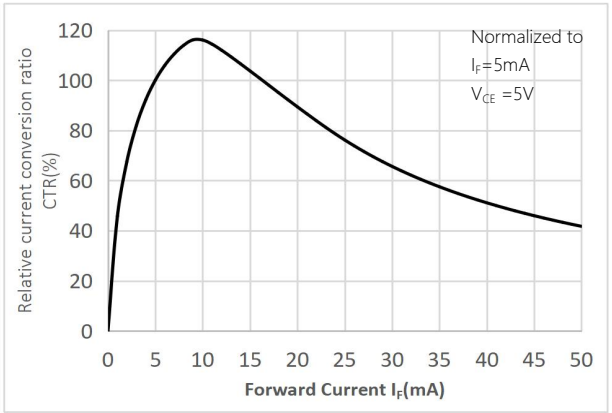


Fig.7 Collector-emitter Saturation Voltage vs Forward Current

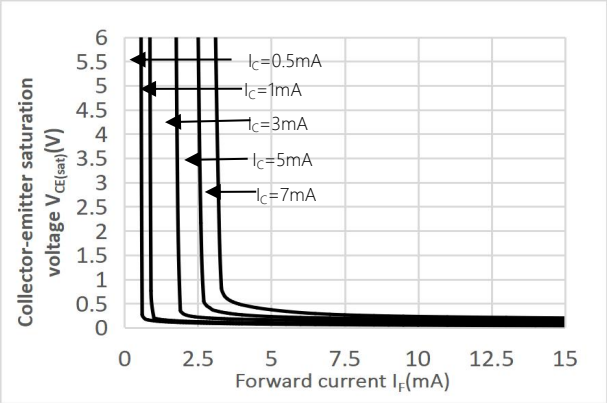


Fig.8 Switching Time Test Circuit & Waveforms

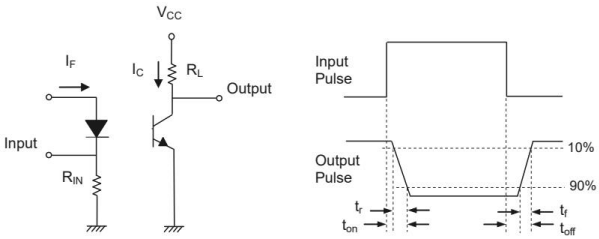


Fig.9 Response Time vs. Load Resistance

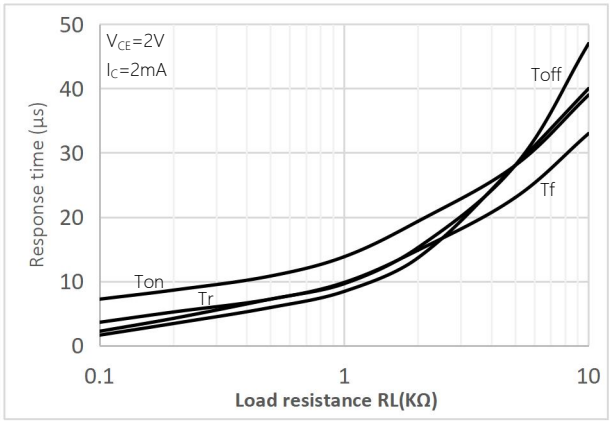
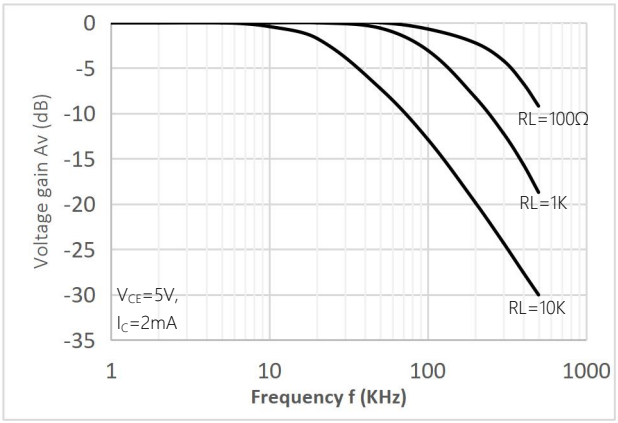
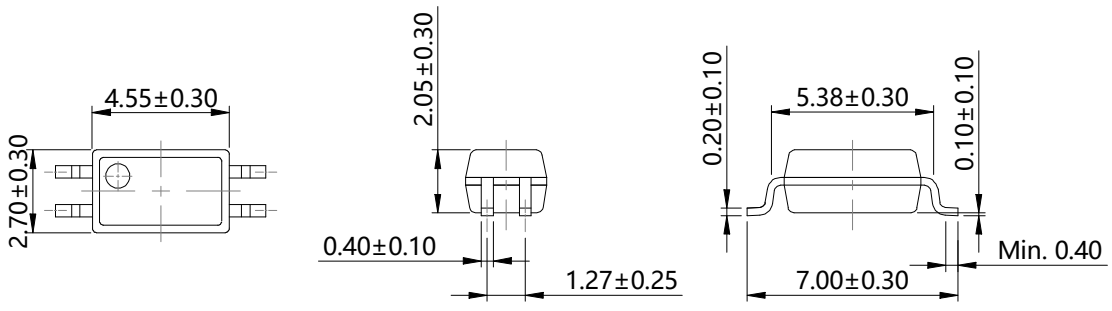


Fig.10 Frequency Response



10. 外形尺寸 Outline Dimensions

单位 Unit: mm



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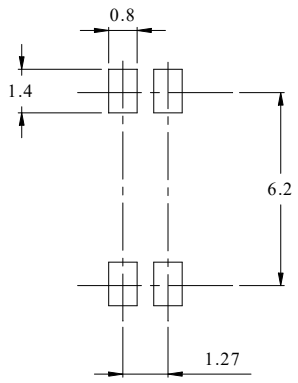
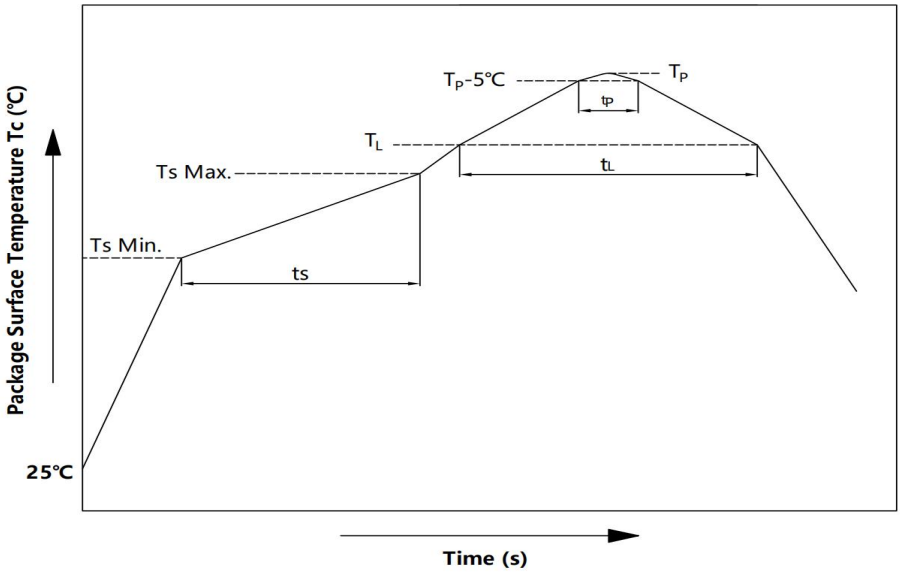
11. 建议焊盘布局 Recommended Pad Layout

单位 Unit: mm



注：上图为产品正视图。
Note：The picture above is the front view of the product.

12. 回流焊温度曲线图 Solder Reflow Profile



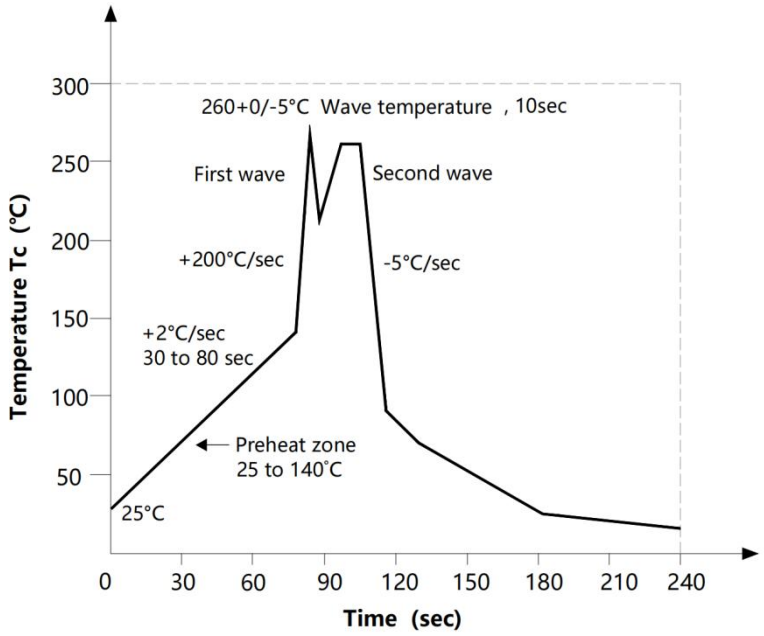
项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	Ts	150	200	℃
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
时间高于 T_L Time Above T_L	t_L	60	150	s
峰值温度 Peak Temperature	T_P	-	260	℃
Tc 在(T_P-5)和 T_P之间的时间 Time During Which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

注 Note:

建议在所示的温度和时间条件下进行回流焊，最多不能超过三次;

Reflow soldering is recommended at the temperatures and times shown, no more than three times;

13. 波峰焊温度曲线图 Wave Soldering Profile



14. 手工烙铁焊接 Soldering with hand soldering iron

焊接温度 360℃ ± 5℃，时间≤3s

Welding temperature 360 ℃± 5 ℃, time ≤ 3s