NQUNXIN
群芯微电子

中国芯 光电梦



晶体管光耦

Photo Transistor

QX101X

(Rev.E)

宁波群芯微电子股份有限公司

NINGBO QUNXIN MICROELECTRONICS CO., LTD.

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概述 Description

QX101X是一款由一个GaAs发光二极管和一个NPN光电晶体管组成的光电耦合器。
The QX101X is a photoelectric coupler composed of a GaAs light-emitting diode and a NPN photo transistor.

特性 Features

- 电流转换比(CTR)范围: ≥50% (I_F=5mA, V_{CE}=5V, Ta=25℃)
  Current transfer ratio: ≥50% (I_F=5mA, V_{CE}=5V, Ta=25℃)
- 输入-输出隔离电压 (V_{ISO}=5000 Vrms)
  High isolation voltage between input and output(V_{ISO}=5000 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℃
- 符合加强绝缘标准
  Meet reinforced insulation standards
- 符合安规标准：UL 1577，VDE DIN EN60747-5-5 (VDE 0884-5），CQC11-471543-2022
  Meet safety standard approval: UL 1577, VDE DIN EN60747-5-5 (VDE 0884-5），CQC11-471543-2022

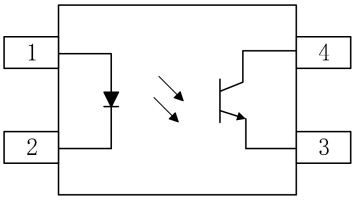
应用 Applications

- 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.

封装和原理图 Package and Schematic Diagram



LSOP4



Pin Configuration
1. Anode
2. Cathode
3. Emitter
4. Collector

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产品型号命名规则 Order Code

QX 101 X - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦ ⑧

① 公司代码 Company Code（QX: 群芯 Qunxin）
② 产品系列 Product Series（101: 101）
③ CTR 档位 Classification（代码 Code: 0,1,2,3....）
④ 框架类型 Lead Frame（Cu: 铜框架 Copper）
⑤ 树脂类型 Epoxy Type（H: 无卤 Halogen-free）
⑥ 封装形式 Package（L: LSOP）
⑦ 产品版本 Product Versions（E：版本号 Version number）
⑧ 器件工作温度范围 Device Operating Temperature Range（特殊范围需填或者空白 Special Range need to be filled in or left blank）

印字信息 Marking Information

- 印字中"Q"为群芯品牌 LOGO
  "Q"denotes LOGO
- 印字中的"X"代表产品分档：0、1、2、3....
  "X"denotes the classification：0、1、2、3....
- 印字中"Y"代表年份；A(2018),B(2019),C(2020).....
  "Y"denotes YEAR：A(2018), B(2019), C(2020).....
- 印字中"WW"代表周号
  "WW"denotes Week's number
- 印字中"E"代表产品版本号
  "E"denotes product versions
- 印字中的"H"代表无卤
  "H"denotes Halogen-free



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绝缘和安规信息 Insulation and Safety related specifications

项目 Item	符号 Symbol	数值 Value	单位 Unit	备注 Remark
爬电距离 Creepage Distance	L	> 8.0	mm	从输入端到输出端，沿本体最短距离路径 Measured from input terminals to output terminals, shortest distance path along body
电气间隙 Clearance Distance	L	> 8.0	mm	从输入端到输出端，通过空气的最短距离 Measured from input terminals to output terminals, shortest distance through air
绝缘距离 Insulation Thickness	DTI	> 0.4	mm	发射器和探测器之间的绝缘厚度 Insulation thickness between emitter and detector
峰值隔离电压 Peak Isolation Voltage	V_{IORM}	1500	V_{peak}	DIN/EN/IEC EN60747-5-5
瞬态隔离电压 Transient isolation voltage	V_{IOTM}	7000	V_{peak}	DIN/EN/IEC EN60747-5-5
隔离电压 Isolation Voltage	Viso	> 5000	Vrms	For 1 min

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
	反向电压 Reverse Voltage	V_R	6	V
	功耗 Power Dissipation	P_D	70	mW
	热阻(结-环境) Thermal Resistance Junction to Ambient	RthJ-A	250	℃/W
	热阻(结-壳) Thermal Resistance Junction to Case	RthJ-C	180	℃/W
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}	6	V
总功耗 Total Power Dissipation		Ptot	250	mW
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	℃

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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=1MHz	-	30	250	pF
接收端 Output	集电极暗电流 Collector Dark Current	I_{CEO}	V_{CE}=20V, I_F=0mA	-	-	100	nA
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV_{CEO}	I_C=0.1mA, I_F=0mA	80	-	-	V
	发射极-集电极击穿电压 Emitter-Collector Breakdown Voltage	BV_{ECO}	I_E=10μA, I_F=0mA	6	-	-	V
传输特性 Transfer Characteristics	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	$V_{CE(sat)}$	I_F=10mA,I_C=1mA	-	-	0.3	V
	隔离电阻 Isolation Resistance	R_{ISO}	DC500V,40~60%R.H.	$1x10^{12}$	-	-	Ω
	响应时间(ON) Response Time (ON)	Ton	V_{CE}=5V,I_C=5mA R_L=100Ω	-	4	-	μs
	响应时间(OFF) Response Time (OFF)	Toff	V_{CE}=5V,I_C=5mA R_L=100Ω	-	3	-	μs
	上升时间 Rise Time	T_r	V_{CE}=5V,I_C=5mA R_L=100Ω	-	2	18	μs
	下降时间 Fall Time	T_f	V_{CE}=5V,I_C=5mA R_L=100Ω	-	3	18	μs
	截止频率 Cut-off Frequency	Fc	V_{CE}=5V, I_C=2mA R_L=100Ω, -3dB	-	80	-	kHz

电流传输比分档表 CTR Classification Table (Ta=25℃)

参数 Parameter		符号 Symbol	条件 Condition	最小值 Min.	标准值 Typ.	最大值 Max.	单位 Unit.
传输特性 Transfer Characteristics	电流传输比 CTR*	QX1010	I_F=5mA ,V_{CE}=5V	50	-	600	%
		QX1011		100	-	200	%
		QX1017		80	-	160	%
		QX1018		130	-	260	%
		QX1019		200	-	400	%
		QX1012	I_F=10mA ,V_{CE}=5V	63	-	125	%
		QX1013		100	-	200	%
		QX1014		160	-	320	%
		QX1011	I_F=0.5mA ,V_{CE}=5V	15	-	90	%
		QX1012		5	-	55	%
		QX1013		10	-	80	%
		QX1014		20	-	130	%

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

Fig.1 Forward Current vs Forward Voltage

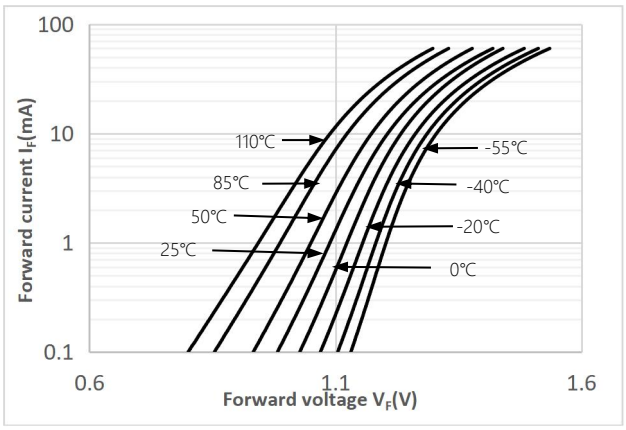


Fig.2 Collector Dark Current vs Ambient Temperature

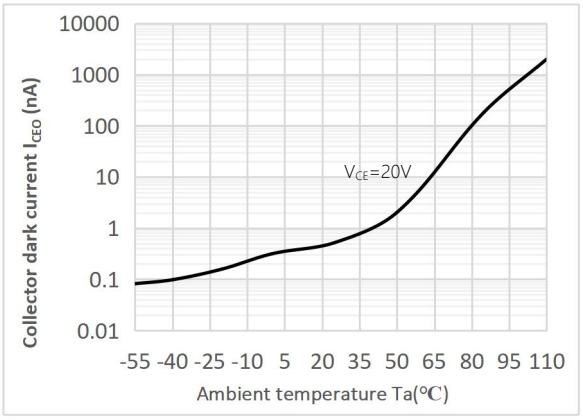


Fig.3 Collector Current vs. Collector-emitter Voltage

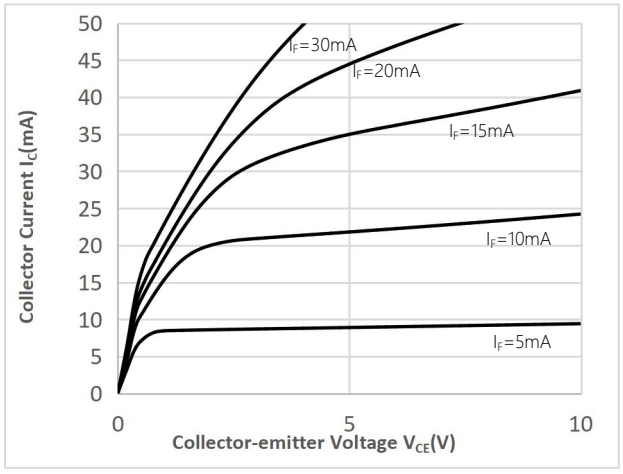


Fig.4 Relative Current Transfer Ratio vs. Forward Current

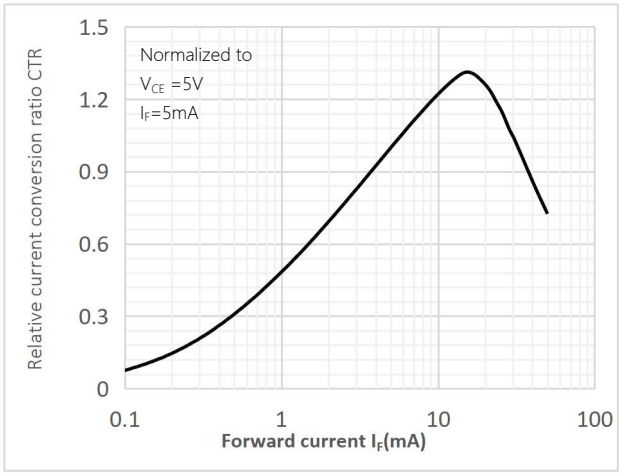


Fig.5 Relative Current Transfer Ratio vs. Forward Current

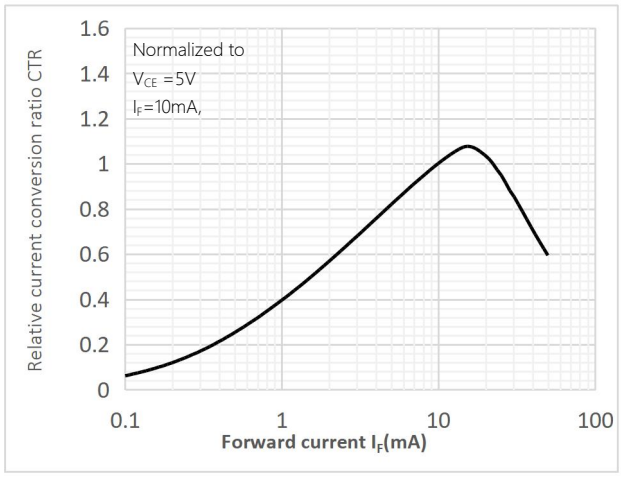
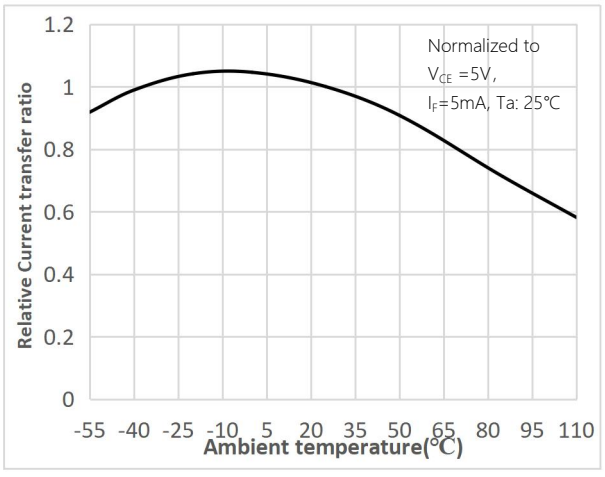


Fig.6 Relative Current transfer ratio vs Ambient temperature



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Fig.7 Relative Current transfer ratio vs Ambient temperature

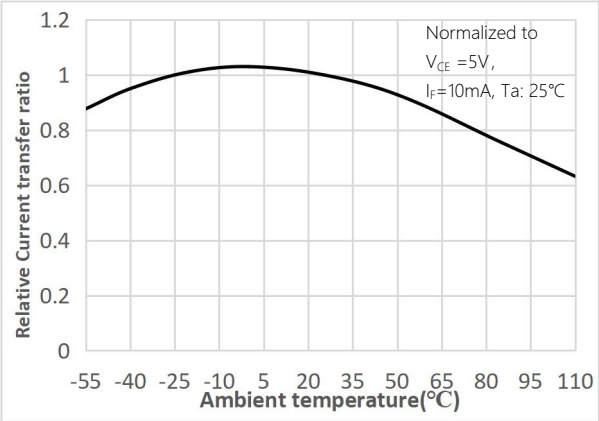


Fig.8 Collector-emitter Saturation Voltage vs. Ambient temperature

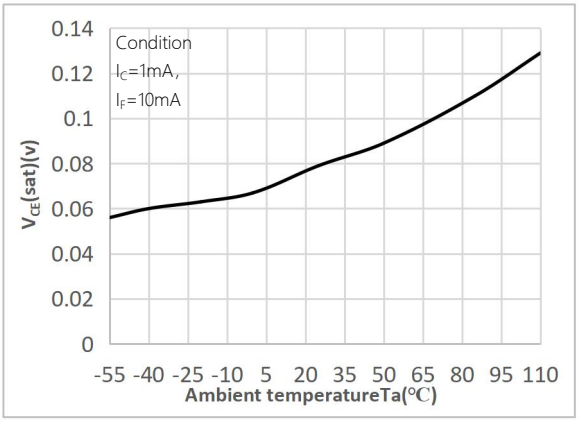


Fig.9 Turn on/Turn off vs. Collector Current

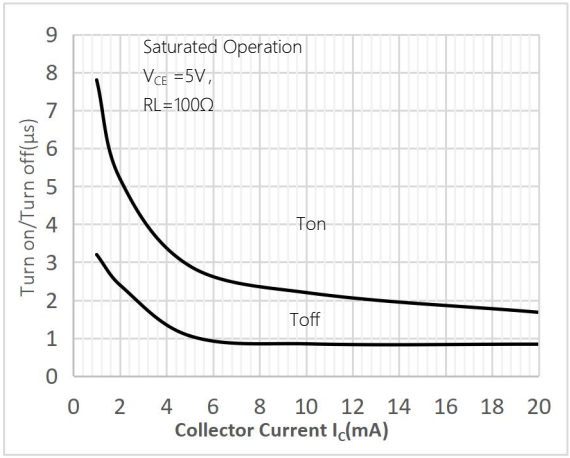


Fig.10 Turn on/Turn off vs Forward current

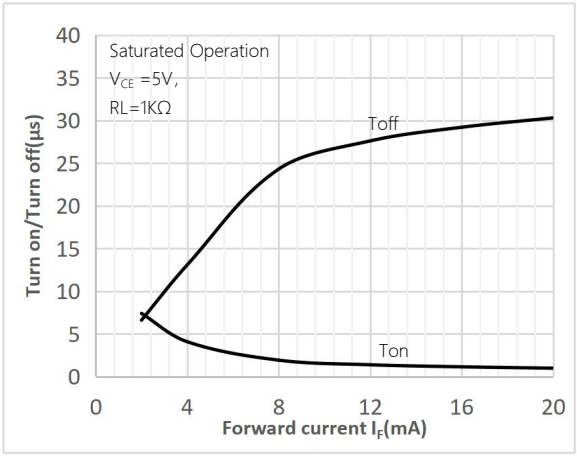


Fig.11 Collector-emitter Saturation Voltage vs Forward Current

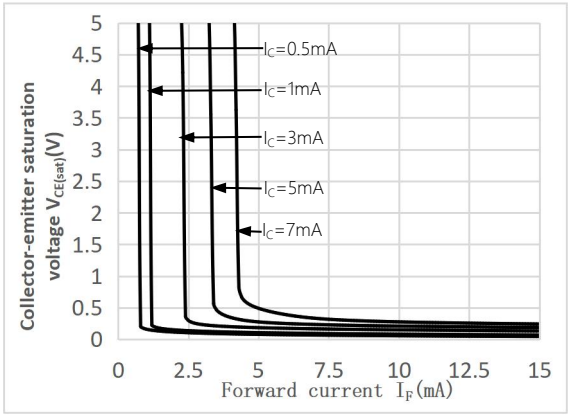
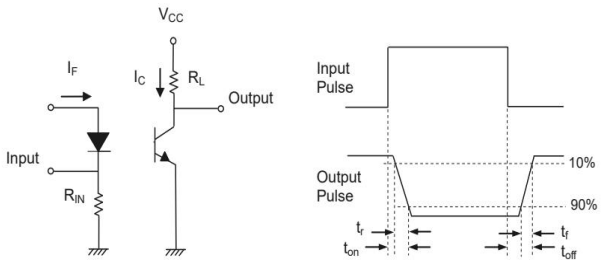


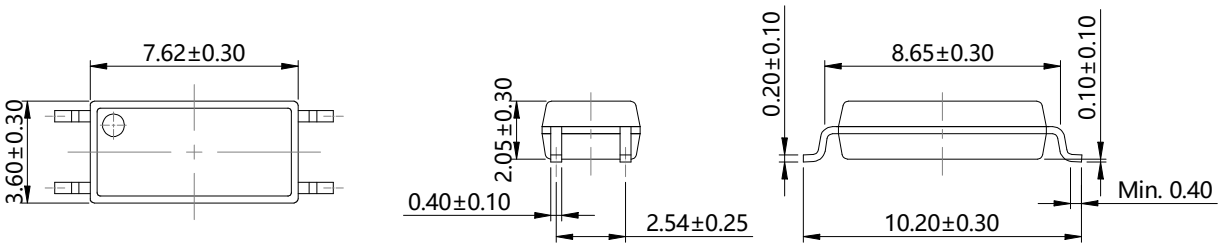
Fig.12 Switching Time Test Circuit & Waveforms



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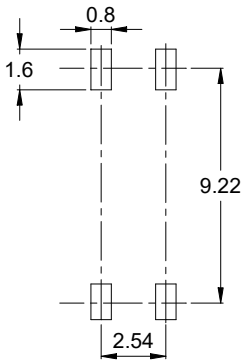
外形尺寸 Outline Dimensions

LSOP4



单位 Unit: mm

建议焊盘布局 Recommended Pad Layout

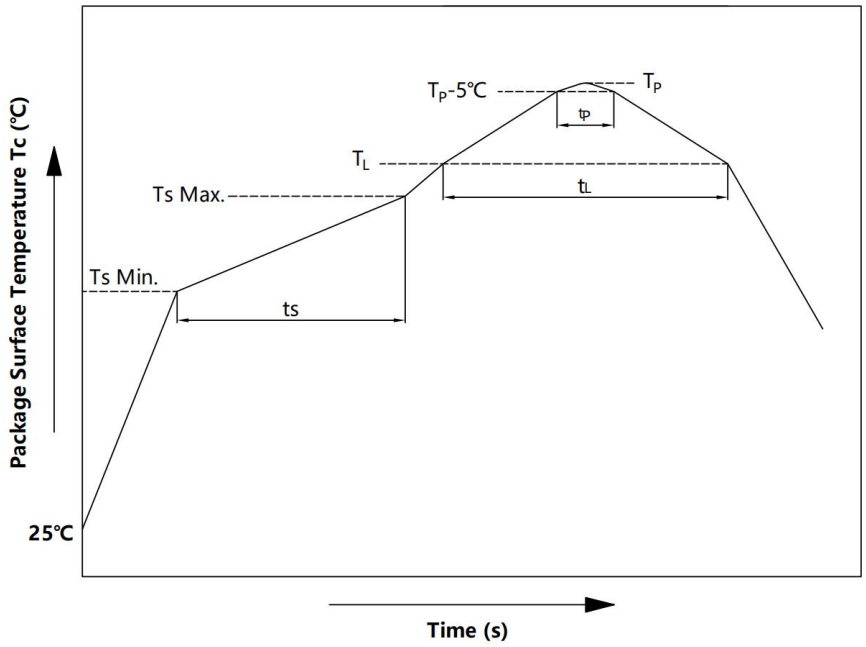


单位 Unit: mm

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

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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

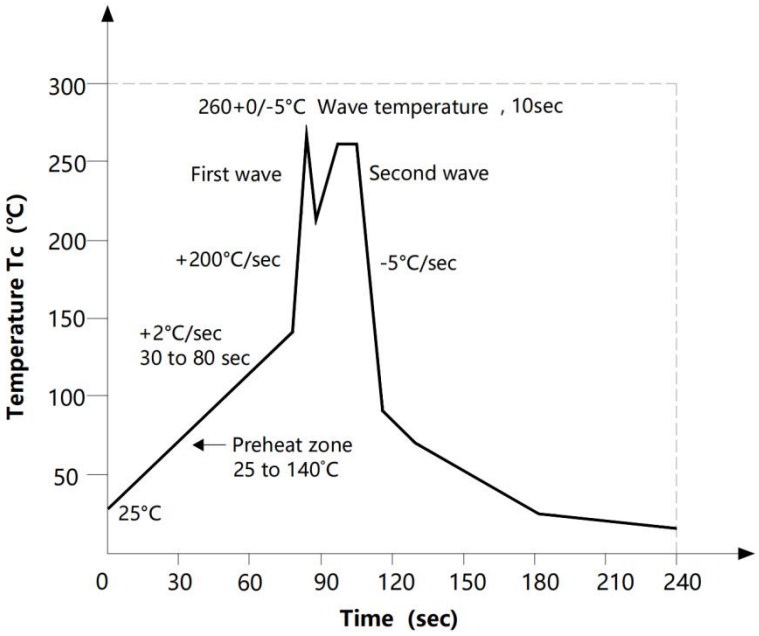
注 Note:

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;

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波峰焊温度曲线图 Wave Soldering Profile



手工烙铁焊接 Soldering with hand soldering iron

A. 手工烙铁焊仅用于产品返修或样品测试；

Hand soldering iron is only used for product rework or sample testing;

B. 手工烙铁焊要求：温度 360℃ ± 5℃，时间≤3s。

Hand soldering iron requirements：Temperature：360℃ ± 5℃, within 3s.

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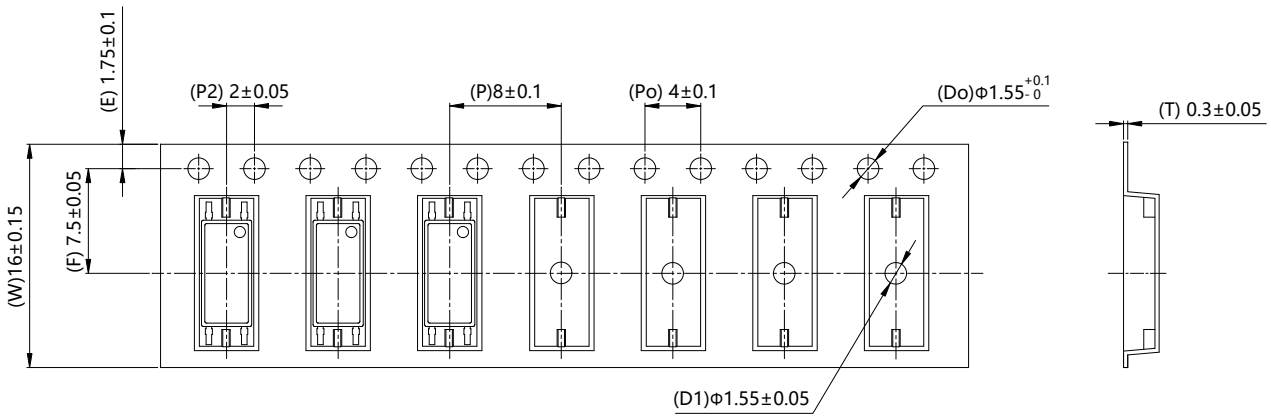
包装 Packing

■ 汇总表 Summary table

封装形式	包装方式	盘数量	盒数量	箱数量	静电袋规格	盒规格	箱(双瓦楞)规格	备注
LSOP4	卷盘 (ϕ330mm 蓝盘)	3000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	353*340*60mm	650*375*365mm	首端各空 50 个空格，末端空 100
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
LSOP4	Reel (ϕ330mm Blue)	3000 pcs /reel	2 reels /box	10 boxes /ctn	450*390*0.1mm	353*340*60mm	650*375*365mm	Leave 50 Spaces at the beginning and 100 Spaces at the end

■ 编带包装 Tape & Reel

1) 每卷数量：3000 只。
   Qty/reel：3000 pcs.
2) 每箱数量：60000 只。
   Qty/ctn：60000 pcs.
3) 内包装：每盒 2 盘。
   Inner packing：2 reels/box.
4) 示意图 Schematic：



单位/unit：mm

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