AOTE SEMICONDUCTOR

高速光耦
High Speed Photo Coupler

ATM6XX

Product Data Sheet

AOTE DCC
RELEASE

台湾奥特半导体科技有限公司

TAIWAN AOTE SEMICONDUCTOR TECHNOLOGY CO.,LTD

www.aotesemi.com

概述 Description

ATM600、ATM601、ATM611 内部有一个 850nm 的 AlGaAS LED， 其光学耦合到具有选通输出的超高速集成光电检测器。这些器件采用 5 引脚外形封装， 符合标准封装外形。

The ATM600 ATM601 ATM611 optocoupler consists of a 850 nm AlGaAS LED, optically coupled to a very high speed integrated photo-detector logic gate with a strobable output.The devices arepackaged in a 5-pin small outline package which conforms to the standard footprint.

特性 Features

- 输入-输出隔离电压 (V_{ISO}=3750 Vrms)
  High isolation voltage between input and output(V_{ISO}=3750 Vrms)
- 工作温度： -40℃ ~85℃
  Operating Temperature: -40℃ ~85℃
- 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 : UL 1577, VDE DIN EN60747-5-5 (VDE 0884-5) ， CQC11-471543-2022

应用 Applications

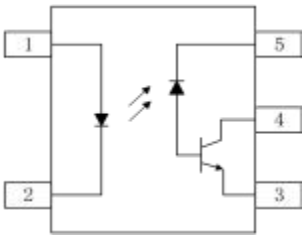
- 开关电源， 智能电表
  Switching power supply, intelligent meter
- 工业控制， 测量仪器
  Industrial control, measuring instruments
- 办公设备， 比如复印机
  Office equipment such as copiers
- 家用电器， 比如空调、风扇、热水器等
  Household appliances: such as air conditioners, fans, water heaters, etc.

真值表 Truth table

LED	VO
OFF	H
ON	L

封装和原理图 Package and Schematic Diagram

SOP5



Pin Configuration

1. Anode
2. Cathode
3. GND
4. VO
5. VCC

注： 在引脚 3 和 5 之间必须连接一个 0.1uF 的旁路电容器。
Note: 0.1uF bypass capacitor must be connected between pins 3 and 5.

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产品型号命名规则 Order Code

AT M6XX - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦

① 公司代码 Company Code（AT: 奥特 Aote)

② 产品系列 Product Series（XX: 00, 01, 11)

③框架类型 Lead Frame（Cu: 铜框架 Copper)

④ 树脂类型 Epoxy Type（H: 无卤 Halogen-free)

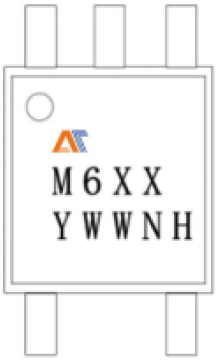
⑤ 封装形式 Package（S: SOP)

⑥ 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)

⑦ 内部补充代码 Internal Supplementary Code（数字或者空白 Number or None)

印字信息 Marking Information

- 印字中“ ”为奥特品牌 LOGO
  “ ” denotes LOGO
- 印字中的“XX”代表产品分档： 00、 01、11
  “XX” denotes the classification： 00、01、11
- 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“N”代表星期几
  “N” denotes day of the week
- 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	> 5.0	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	> 5.0	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}	600	V_{peak}	DIN/EN/IEC EN60747-5-5
瞬态隔离电压 Transient isolation voltage	V_{IOTM}	5000	V_{peak}	DIN/EN/IEC EN60747-5-5
隔离电压 Isolation Voltage	Viso	> 3750	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	5	V
	功耗 Power Dissipation	P_D	100	mW
接收端 Output	电源电压 Supply Voltage	Vcc	7.0	V
	输出电流 Output Current	Io	50	mA
	输出电压 Output Voltage	Vo	7.0	V
	集电极功耗 Collector Power Dissipation	P_C	85	mW
工作温度 Operating Temperature		T_{opr}	-40 ~ +85	℃
存储温度 Storage Temperature		T_{stg}	-55 ~ +125	℃
焊接温度 Soldering Temperature		T_{sol}	260	℃

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推荐工作条件 Recommended Operating Conditions

参数 Parameter	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
电源电压 Supply Voltages	V_{CC}	4.5	5.5	V
高电平输入电流 Input Current , High level	IF_H	5	10.0	mA
低电平输入电流 Input Current , Low level	IF_L	0	250	uA
操作温度 Operating Temperature	Ta	-40	+85	℃

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=10mA	-	1.33	1.8	V
	反向击穿电压 Reverse Breakdown Voltage	BV_R	I_R=10μA	5	-	-	V
	电容 Capacitance	C_{IN}	V=0,f=1MHz	-	70	-	pF
	正向电压的温度系数 Diode Temperature Coefficient	$\Delta V_F/\Delta T_A$	I_F=10mA	-	-1.9	-	mV/°C
接收端 Output	高电平电源电流 High Level Supply Current	I_{CCH}	V_{CC}=5.5V ,I_F =0mA	-	6.0	9	mA
	低电平电源电流 Low Level Supply Current	I_{CCL}	V_{CC}=5.5V ,I_F =0mA	-	7.5	10	mA
传输特性 Transfer Characteristics	高电平输出电流 HIGH Level Output Current	I_{OH}	V_{CC}=5.5V V_O=5.5V I_F=250μA	-	2.1	30	μA
	低电平输出电压 LOW Level Output Voltage	V_{OL}	V_{CC}=5.5V I_F=5mA I_{CL}=13mA	-	0.4	0.6	V
	输入阈值电流 Input Threshold Current	I_{TH}	V_{CC}=5.5V V_O=0.6V I_{OL}=13mA	-	2.4	5	mA
隔离电压 Isolation Voltage		V_{ISO}	R_H <50% T_A=25℃ I_{IO} ≤ 50μA	3750	-	-	V_{RMS}
电阻（输入到输出） Resistance (Input to Output)		R_{I-O}	V_{I-O}=500V	-	10^{12}	-	Ω
电容（输入到输出） Resistance (Input to Output)		C_{I-O}	f=1MHz	-	0.6	-	pF

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开关特性 Switching Specification(Ta =25℃,I_F =7.5mA,V_{CC}=5.0V)

参数 Parameter		符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
输出高电平传播延迟 Propagation Delay Time to High Output Level		T_{PLH}	C_L=15pF R_L=350Ω T_A=25°C	-	41	100	ns
输出低电平传播延迟 Propagation Delay Time to Low Output Level		T_{PHL}		-	50	100	ns
脉宽失真 Pulse Width Distortion		$\|T_{PHL}-T_{PLH}\|$		-	9	35	ns
输出上升时间(10% – 90%) Output Rise Time (10 to 90%)		t_r		-	40	-	ns
输出下降时间(90% - 10%) Output Fall Time (90 to 10%)		t_f		-	10	-	ns
传播延迟偏斜 Propagation Delay Skew		t_{psk}		-	-	40	ns
输出高电平共模瞬态抑制 Common Mode Transient Immunity at High Output Level	M600	$\|CM_H\|$	T_A=25°C,I_F=0mA $\|V_{CM}\|$=10V(Peak) V_{OH}=2.0V,R_L=350Ω	-	-	-	V/µs
	M601		T_A=25°C,I_F=0mA $\|V_{CM}\|$=50V(Peak) V_{OH}=2.0V,R_L=350Ω	5000	-	-	
	M611		T_A=25°C,I_F=0mA $\|V_{CM}\|$=1000V(Peak) V_{OH}=2.0V,R_L=350Ω	20000	-	-	
输出低电平共模瞬态抑制 Common Mode Transient Immunity at Low Output Level	M600	$\|CM_L\|$	I_F=7.5mA,V_{OL}=0.8V R_L=350Ω,T_A=25°C $\|V_{CM}\|$=10V(Peak)	-	-	-	V/µs
	M601		I_F=7.5mA,V_{OL}=0.8V R_L=350Ω,T_A=25°C $\|V_{CM}\|$=50V(Peak)	5000	-	-	
	M611		I_F=7.5mA,V_{OL}=0.8V R_L=350Ω,T_A=25°C $\|V_{CM}\|$=1000V(Peak)	20000	-	-	

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

Fig.1 Low-level voltage vs. Ambient temperature

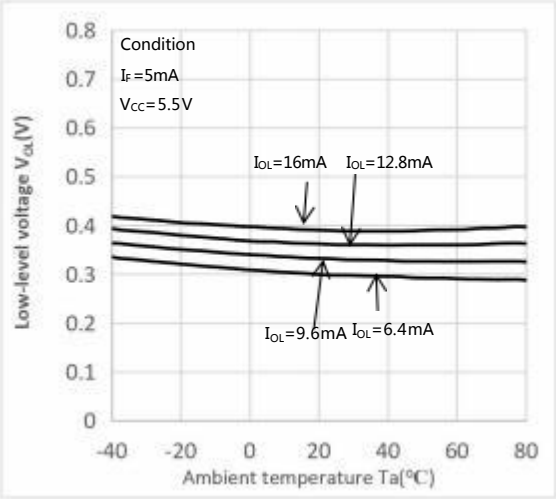

Fig.2 Forward current voltage vs. Forward voltage

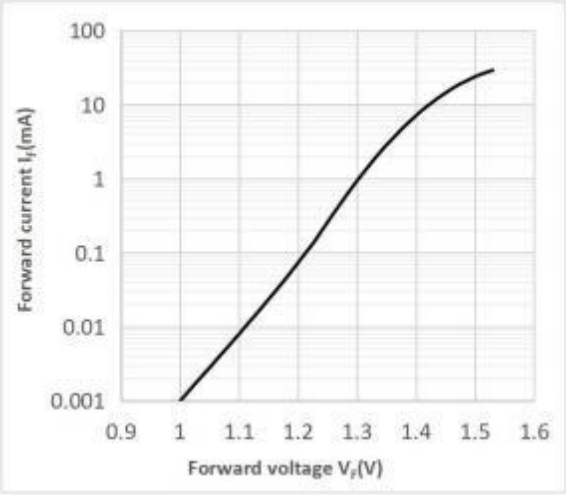

Fig.3 Switch time vs. Forward current

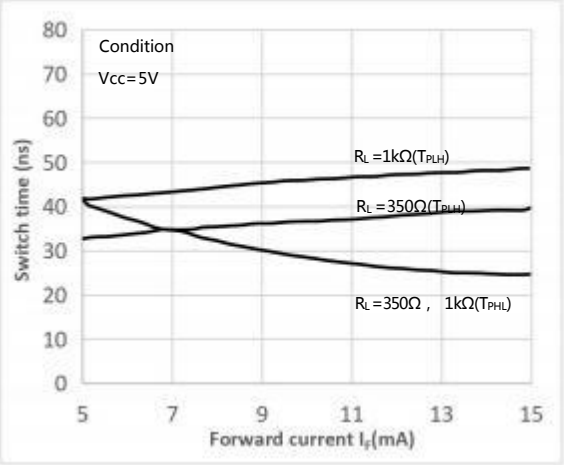

Fig.4 Low-level output current vs. Ambient temperature

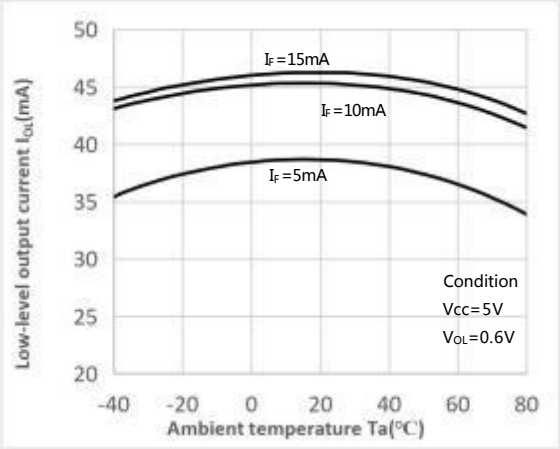

Fig.5 Starting current vs. Ambient temperature

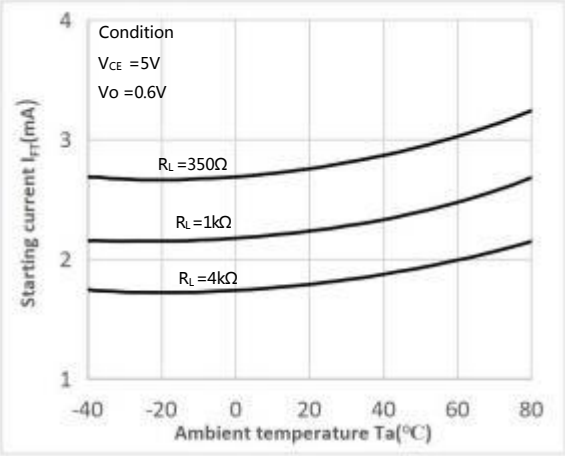

Fig.6 Output voltage vs. Input Forward current

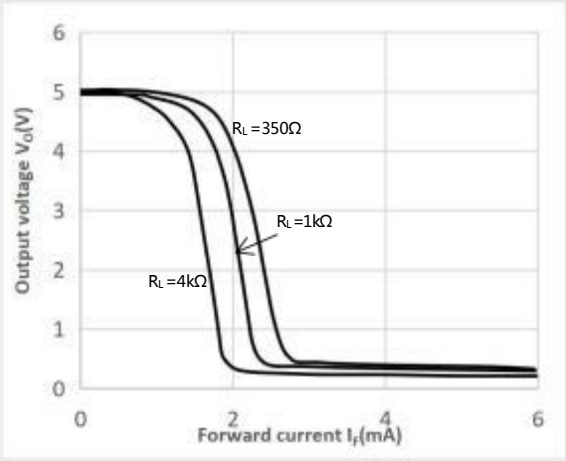

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Fig.7 Pulse-width distortion vs. Ambient temperature

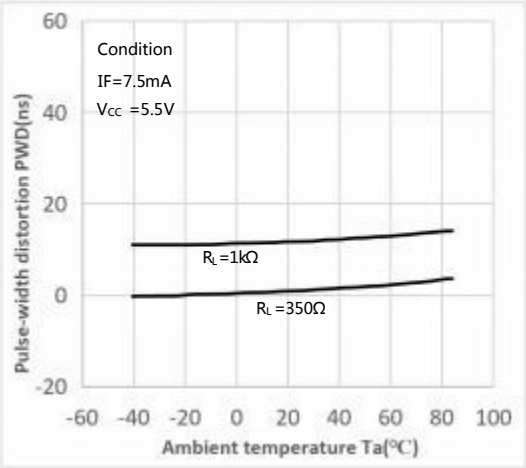
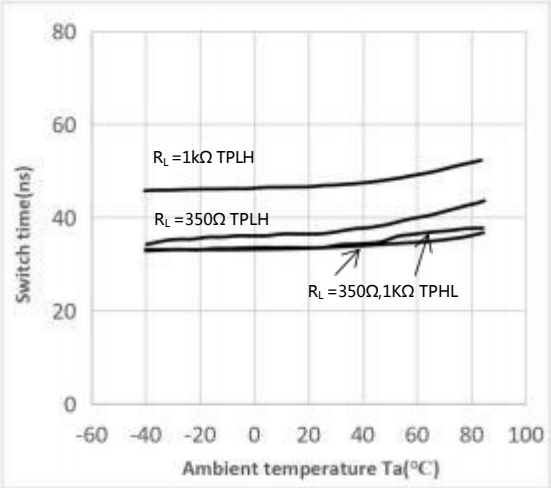
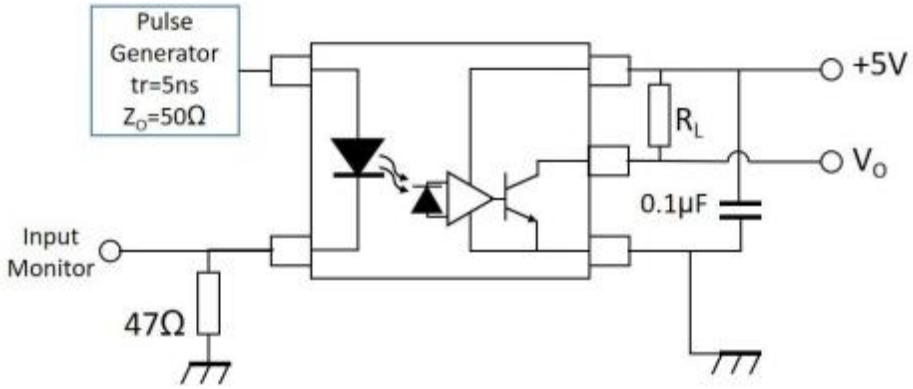
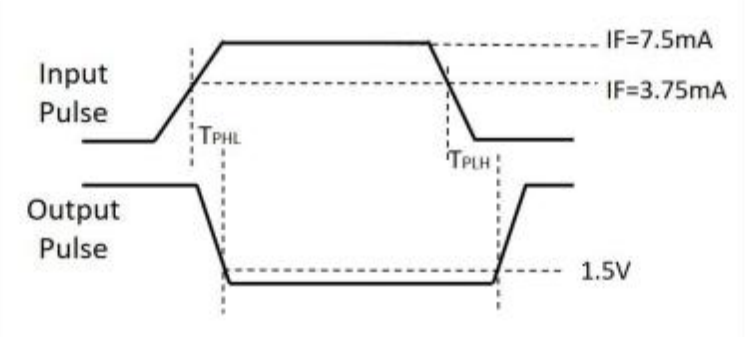


Fig.8 Switch time vs. Ambient temperature



开关时间测试电路 Witch Time Test Circuit





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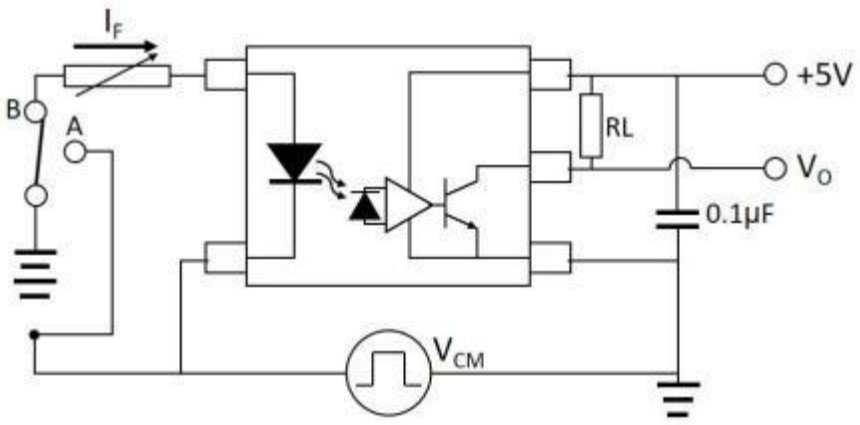
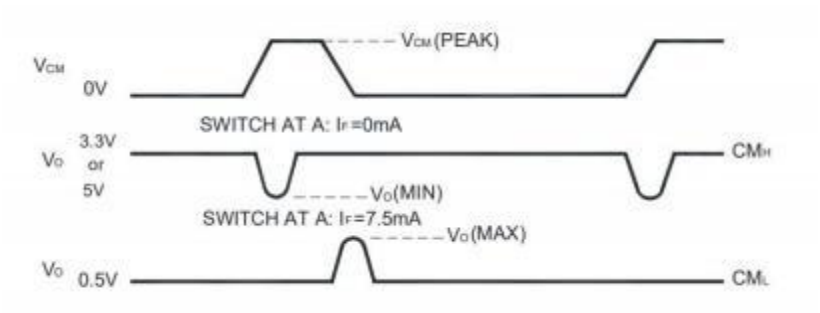
CMR 测试电路 Test Circuit for Common Mode Transient Immunity





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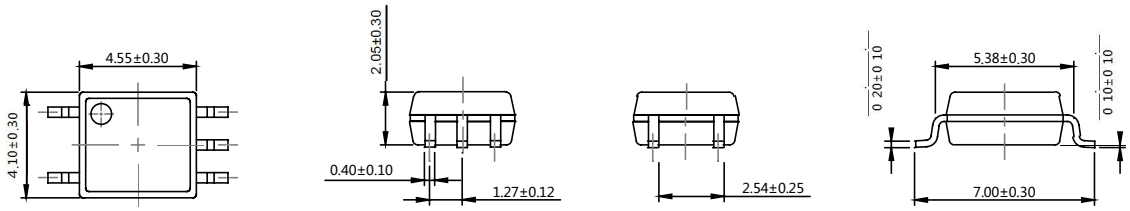
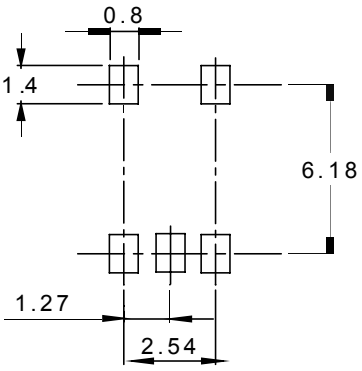
外形尺寸 Outline Dimensions

SOP5



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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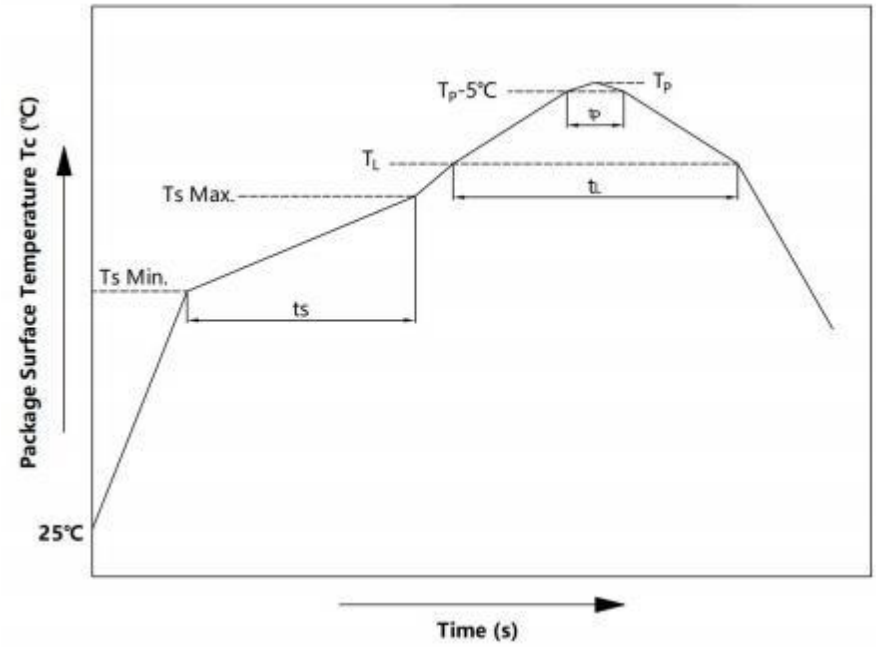
回流焊温度曲线图 Solder Reflow Profile



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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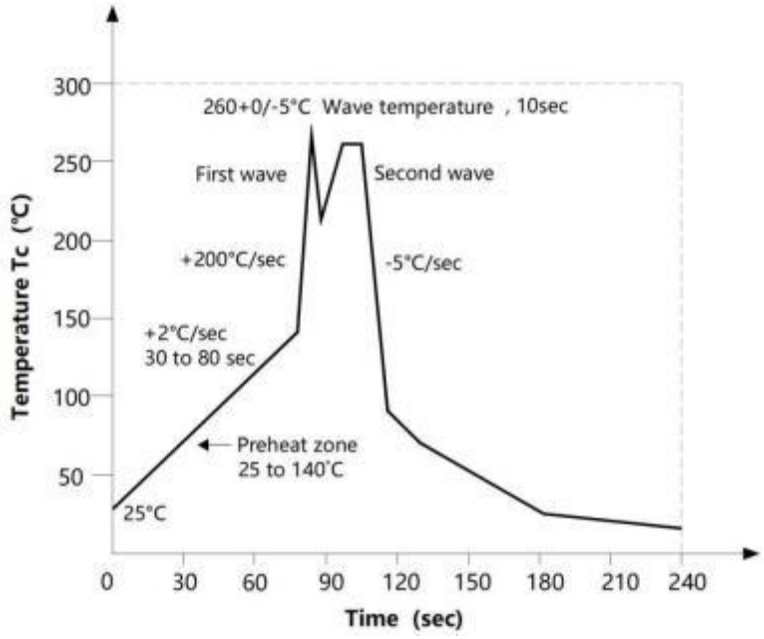
波峰焊温度曲线图 Wave Soldering Profile



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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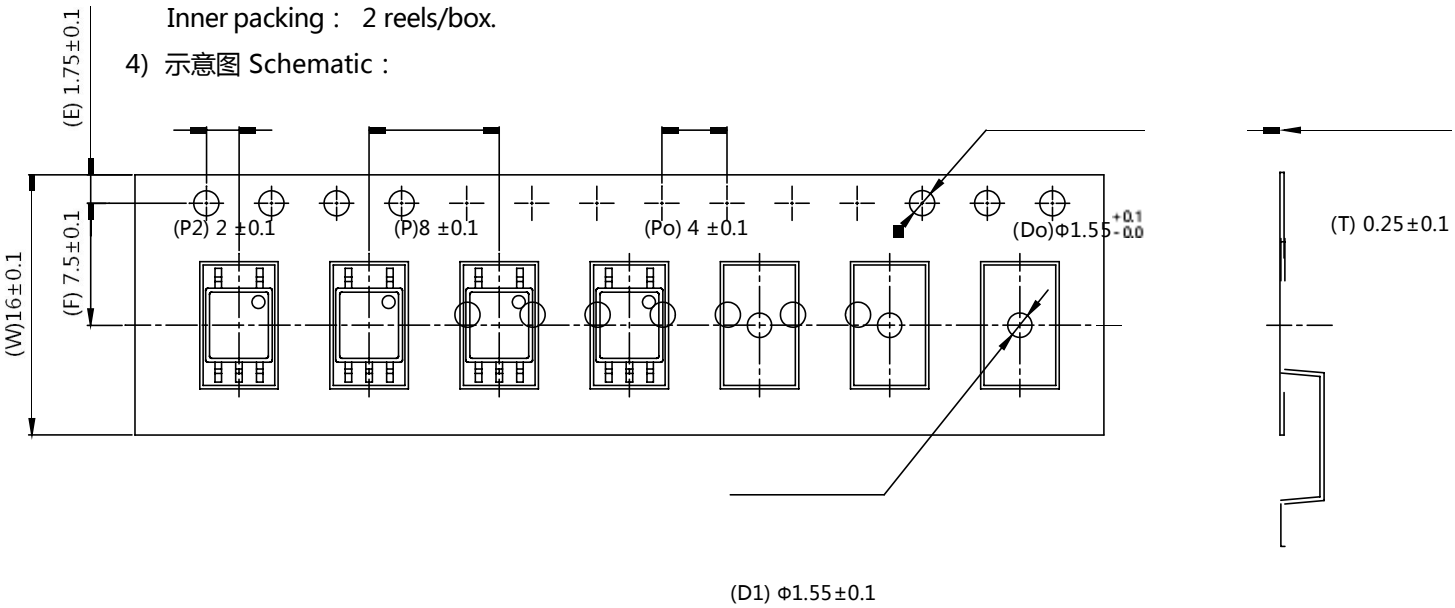
包装 Packing

■ 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
SOP5	编带 (ϕ330mm 蓝)	3k /盘	2 盘/盒	10 盒/箱	450*390*0.1mm	340*60*340mm	620*360*365mm	保护带 200mm (min)
Package Type	**Packing Form**	**Quantity per Reel**	**Quantity per Box**	**Quantity per Carton**	**Antistatic Bag Specification**	**Box Specification**	**Carton Specification**	**Note**
SOP5	Reel(ϕ330mm Blue)	3k pcs/reel	2 reels /box	10 boxes /ctn	450*390*0.1mm	340*60*340mm	620*360*365mm	Guard band 200mm min.

■ 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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