



**高速光耦**  
**High Speed Photo**  
**Coupler**

**ATW720**

**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 . aote se mi . co m](http://www.aotese mi .co m)

## 概述 Description

ATW720 (单通道) 是采用 SOP6 封装的 CMOS 光耦合器。光电耦合器利用最新的 CMOS IC 技术，以极低的功耗实现了卓越的性能。

The ATW720 (single-channel) is CMOS optocouplers in SOP6 package. The optocouplers utilize the latest CMOS IC technology to achieve outstanding performance with very low power consumption.

## 特性 Features

- CMOS 可兼容：+3.3V 和 +5 V  
+3.3V and +5V CMOS compatibility
- 脉冲宽度失真最大值：25ns  
25ns max. pulse width distortion
- 传播延迟最大值：55ns  
55ns max. propagation delay
- 传播延迟倾斜最大值：40ns  
40ns max. propagation delay skew
- 高速：15MBd (最小)  
High speed: 15 MBd min
- 共模抑制最小值：10 kV/μs  
10 kV/μs minimum common mode rejection
- 温度范围：-40°C ~ 105°C  
-40°C to 105°C temperature range
- 无故障上电功能  
Glitch-Free Power-UP Feature
- 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

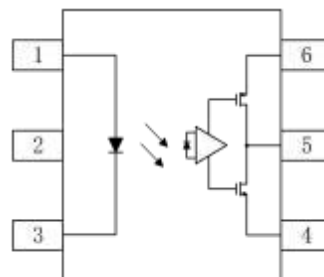
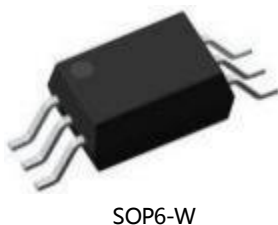
## 应用 Applications

- 消除接地回路  
Ground loop elimination
- 数字现场总线隔离：RS485, RS232, CANbus  
Digital field bus isolation: RS485, RS232, CANbus
- 多路数据传输  
Multiplexed data transmission
- 计算机外围接口

## 真值表 Truthtable

LED	VO
OFF	H
ON	L

## 封装和原理图 packageandschematic Diagram



### Pin Configuration

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

注：在引脚 4 和 6 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 4 and 6.



## 产品型号命名规则 Order code

# AT W720 - 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 ( W720)
- 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 “X” 代表产品分档：0  
“X” denotes the classification：0
- 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” 代表内部代码  
“E” denotes Internal code
- 印字中的 “H” 代表无卤  
“H” denotes Halogen-free



## 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	$V_{iso}$	>5000	Vrms	For 1 min

## 极限参数 Absolute Maximum Ratings ( $T_a = 25^\circ\text{C}$ )

参数 Parameter	符号 Symbol	最小值 Min	最大值 Max	单位 Unit
电源电压 Supply Voltages	$V_{DD}$	0	6.0	V
输出电压 Output Voltage	$V_O$	-0.5	$V_{DD} + 0.5$	V
平均正向输入电流 Average Forward Input Current	$I_F$	-	10.0	mA
平均输出电流 Average Output Current	$I_O$	-	10.0	mA
隔离电压 Isolation voltage	$V_{ISO}$	5000	-	Vrms
工作温度 Operating Temperature	$T_{opr}$	-40	+105	$^\circ\text{C}$
存储温度 Storage Temperature	$T_{stg}$	-55	+125	$^\circ\text{C}$
铅焊温度 Lead Solder Temperature	$T_{SOL}$	260 摄氏度持续 10 秒，座位平面以下 1.6mm 260 $^\circ\text{C}$ for 10 sec, 1.6 mm below seating plane		
焊机回流温度曲线 Solder Reflow Temperature Profile	请参阅回流焊温度曲线部分 See Solder Reflow Temperature Profile Section			

**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	$V_{DD}$	4.5	5.5	V
		3	3.6	V
开启电流 Forward Input Current (ON)	$I_{F(ON)}$	3	10	mA
关断电压 Forward Input Voltage (OFF)	$V_{F(OFF)}$	0	1.3	V
操作温度 Operating Temperature	$T_A$	-40	105	°C

**产品特性参数 Electro-optical characteristics ( $T_a=25\text{ }^\circ\text{C}$ ,  $V_{DD}=3.3\text{V}$ )**

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	$V_F$	$I_F=6\text{mA}$	1	1.3	1.8	V
	反向击穿电压 Reverse Breakdown Voltage	$B_{VR}$	$I_R=10\mu\text{A}$	5.0	-	-	V
接收端 Output	逻辑高输出电压 Logic High Output Voltage	$V_{OH}$	$I_F=0, I_O=-4\text{mA}, V_{DD}=3.3\text{V}$	$V_{DD}-1$	$V_{DD}-0.3$	-	V
			$I_F=0, I_O=-4\text{mA}, V_{DD}=5\text{V}$	$V_{DD}-1$	$V_{DD}-0.2$	-	V
	逻辑低输出电压 Logic Low Output Voltage	$V_{OL}$	$I_F=6\text{mA}, I_O=4\text{mA}, V_{DD}=3.3\text{V}$	-	0.2	0.8	V
			$I_F=6\text{mA}, I_O=4\text{mA}, V_{DD}=5\text{V}$	-	0.35	0.8	V
	输入阈值电流 Input Threshold Current	$I_{TH}$	$I_{OL}=20\mu\text{A}$	-	3	5	mA
	逻辑低输出电源电流 Logic Low Output Supply Current	$I_{DDL}$	$I_F=6\text{mA}$	-	4.5	6.5	mA
	逻辑高输出电源电流 Logic High Output Supply Current	$I_{DDH}$	$I_F=0$	-	4	6	mA

**开关特性switchingspecification(Ta=25 °C,V<sub>DD</sub>=3.3v**

参数 Parameter	符号 Symbol	条件 Condition	最小 Min.	典型 Typ.	最大 Max.	单位 Unit
逻辑低电平传输延迟 Propagation Delay Time to Low Output Level	t <sub>PHL</sub> <sup>1</sup>	I <sub>F</sub> = 6mA, C <sub>L</sub> = 15pF CMOS Signal Levels	-	40	55	ns
逻辑高电平传输延迟 Propagation Delay Time to High Output Level	t <sub>PLH</sub> <sup>1</sup>		-	36	55	
脉冲宽度 Pulse Width	t <sub>PW</sub>		66.7	-	-	
脉宽失真 Pulse Width Distortion  t <sub>PHL</sub> -t <sub>PLH</sub>	PWD		0	4	25	
传播延迟偏斜 Propagation DelaySkew	t <sub>PSK</sub>		-	-	40	
输出上升时间 Output Rise Time (10%~90%)	t <sub>R</sub>		-	3.5	-	
输出下降时间 Output Fall Time (90%~10%)	t <sub>F</sub>		-	3.5	-	
输出高电平共模抑制 Output High Level Common Mode Transient Immunity	CMH  <sup>2</sup>	VCM =1000V I <sub>F</sub> =0mA	10	15	-	kV/μs
输出低电平共模抑制 Output Low Level Common Mode Transient Immunity	CML  <sup>3</sup>	VCM =1000V I <sub>F</sub> =6.0mA	10	15	-	

注：Note:

- 从输入脉冲上升沿的 50%V<sub>DD</sub> 电平到 V<sub>O</sub> 信号下降沿的 50%V<sub>DD</sub> 电平，测量 t<sub>PHL</sub> 传播延迟。从输入脉冲下降沿的 50%V<sub>DD</sub> 水平到 V<sub>O</sub> 信号上升沿的 50%V<sub>DD</sub> 水平，测量 t<sub>PLH</sub> 传播延迟。  
t<sub>PHL</sub> propagation delay is measured from the 50%V<sub>DD</sub> level on the rising edge of the input pulse to the 50% V<sub>DD</sub> level of the falling edge of the V<sub>O</sub> signal. t<sub>PLH</sub> propagation delay is measured from the 50% V<sub>DD</sub> level on the falling edge of the input pulse to the 50% V<sub>DD</sub> level of the rising edge of the V<sub>O</sub> signal.
- CMH 是共模电压上升的最大可容忍速率，以确保输出将保持在高逻辑状态。  
CMH is the maximum tolerable rate of rise of the common mode voltage to assure that the output will remain in a high logic state.
- CML 是共模电压的最大可容忍的下降率，以确保输出将保持在低逻辑状态。  
CML is the maximum tolerable rate of fall of the common mode voltage to assure that the output will remain in a low logic state.

典型光电特性曲线 Typical Electro-optical characteristics curves

Fig.1 Input current vs. Forward Voltage

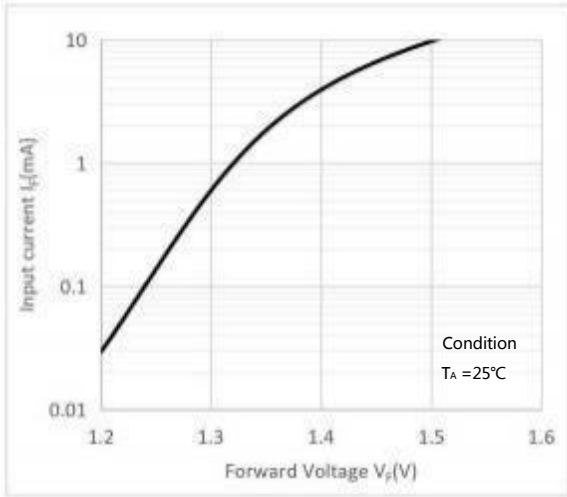


Fig.2 Input threshold current ITH (mA) vs. Ambient temperature

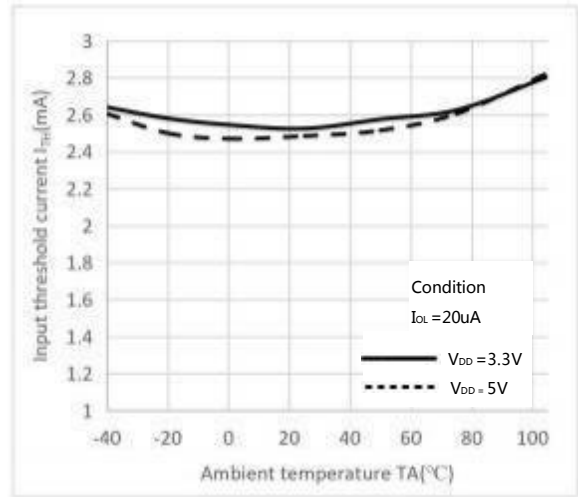


Fig.3 Logic high output supply current I\_OOH (mA) vs. Ambient temperature

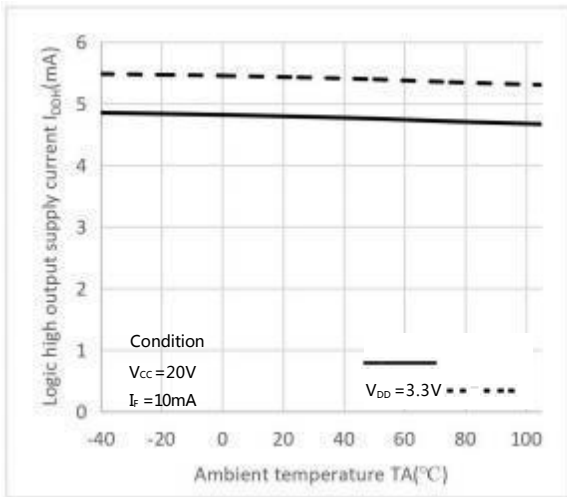


Fig.4 Logic low output supply current I\_OOL (mA) vs. Ambient temperature

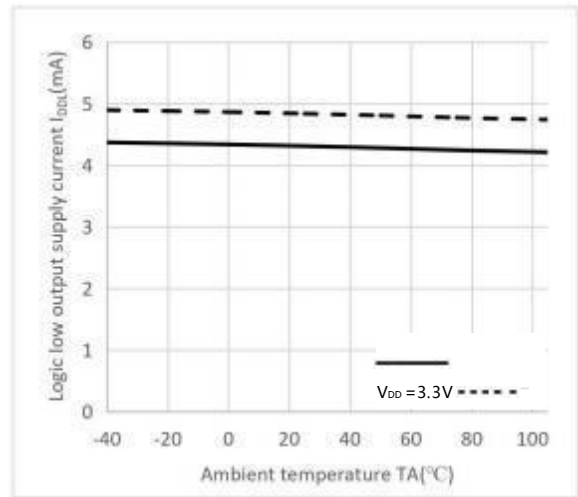


Fig.5 Propagation delay Tps (ns) vs. Pulse input current

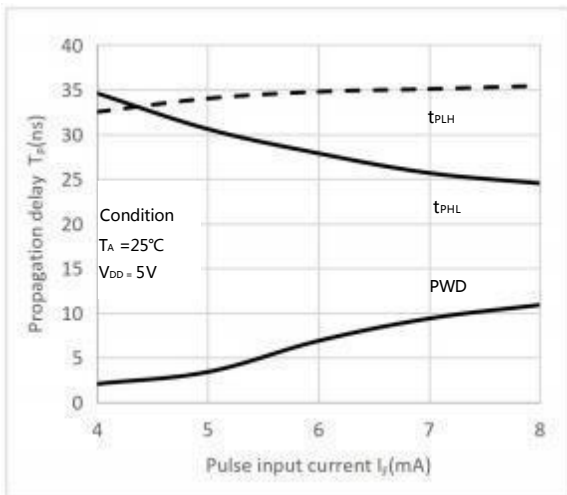


Fig.6 Propagation delay Tps (ns) vs. Pulse input current

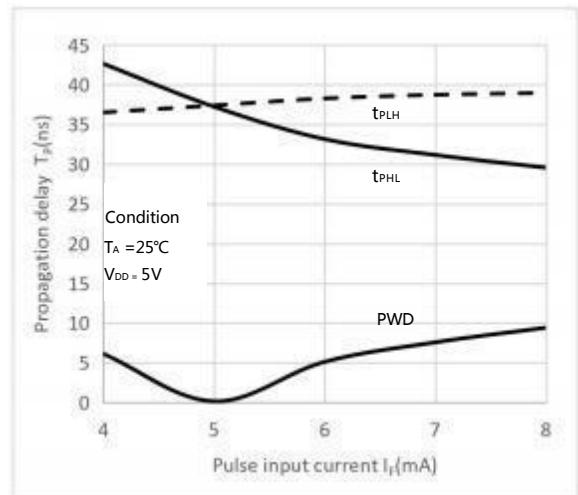


Fig.7 Forward voltage vs. Ambient temperature

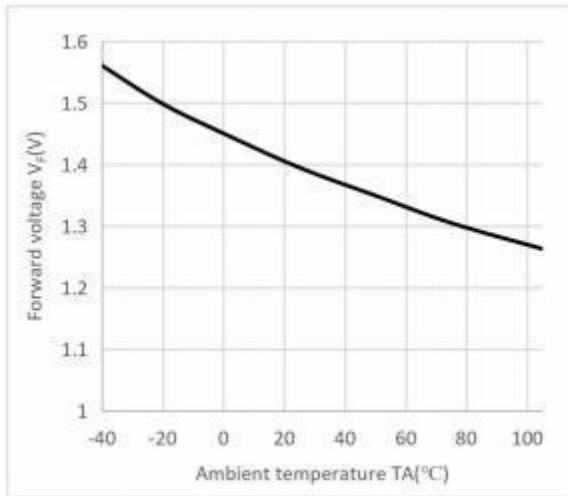


Fig.8 Propagation delay vs. Ambient temperature  
( $V_{DD}=5V, C_{peak}=100pF, R_{limit}=530\ \Omega$ )

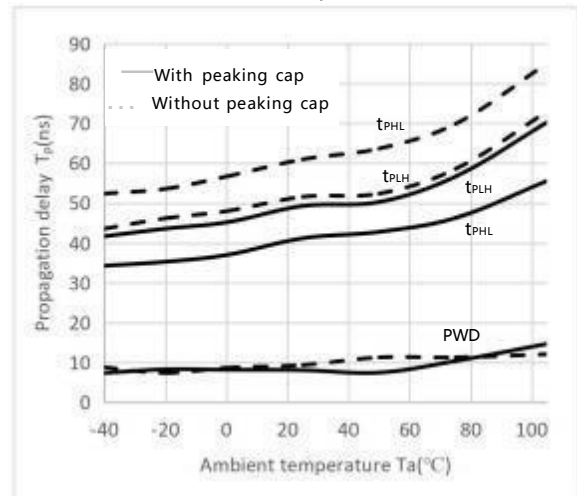
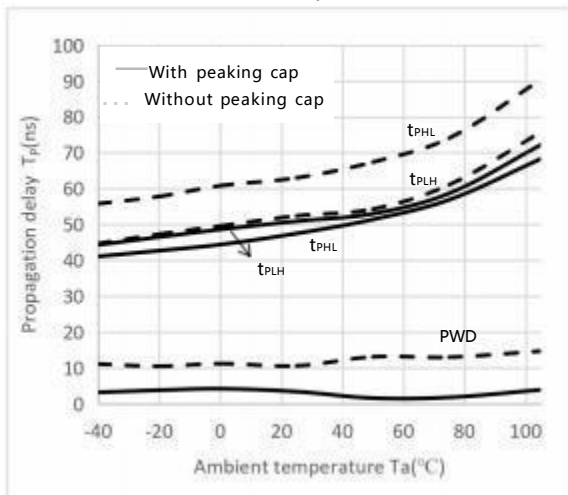
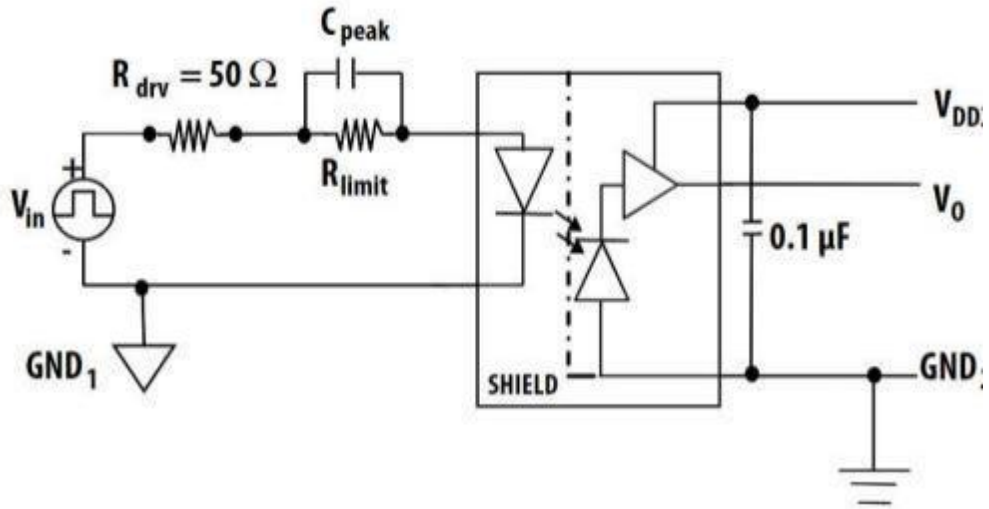


Fig.9 Propagation delay vs. Ambient temperature  
( $V_{DD}=3.3V, C_{peak}=100pF, R_{limit}=250\ \Omega$ )

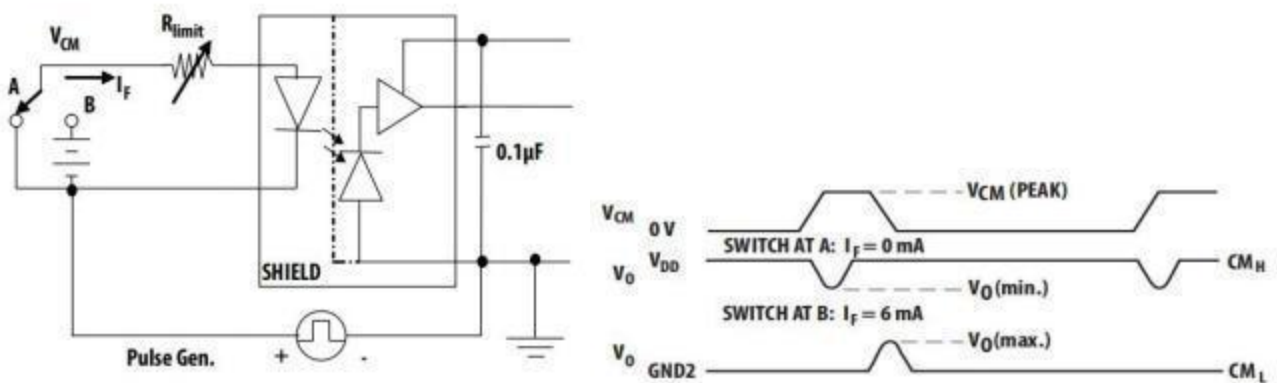




延迟时间测试电路 propagationDelayTimeTestcircuit

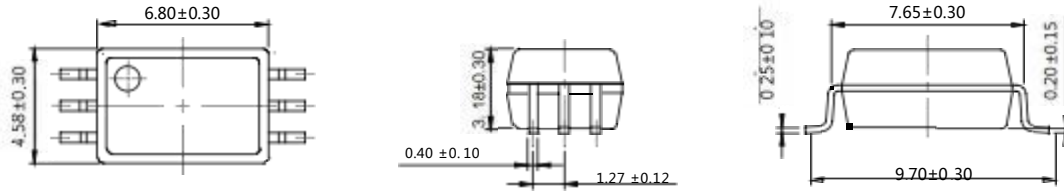


CMR测试电路 Test circuitforcommon ModeTransientImmunity

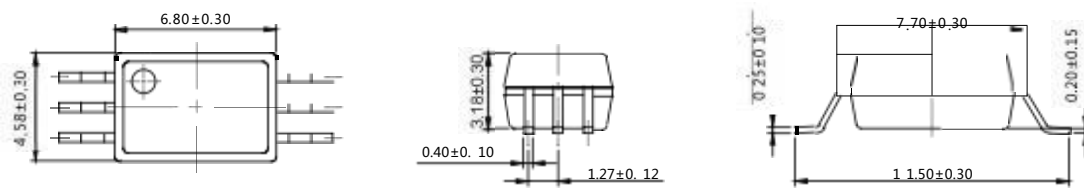


外形尺寸。utlineDimensions

SOP6-W

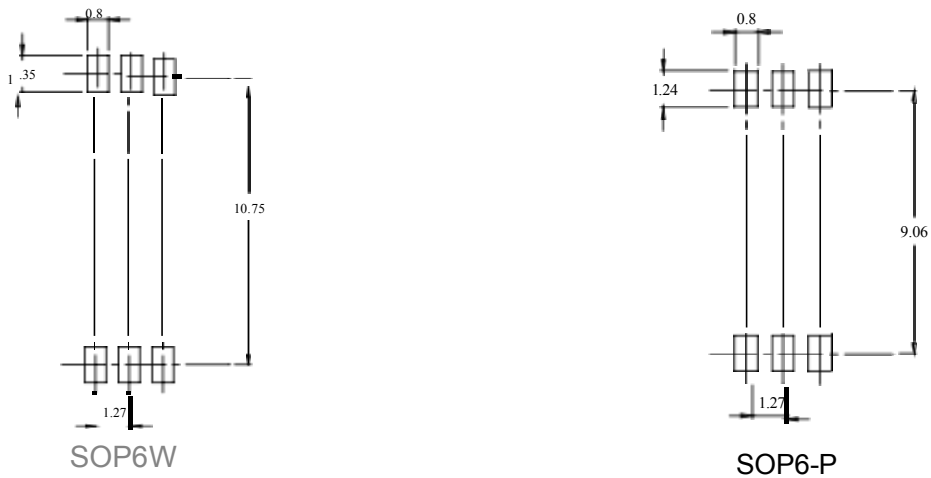


SOP6-P



单位 Unit: mm

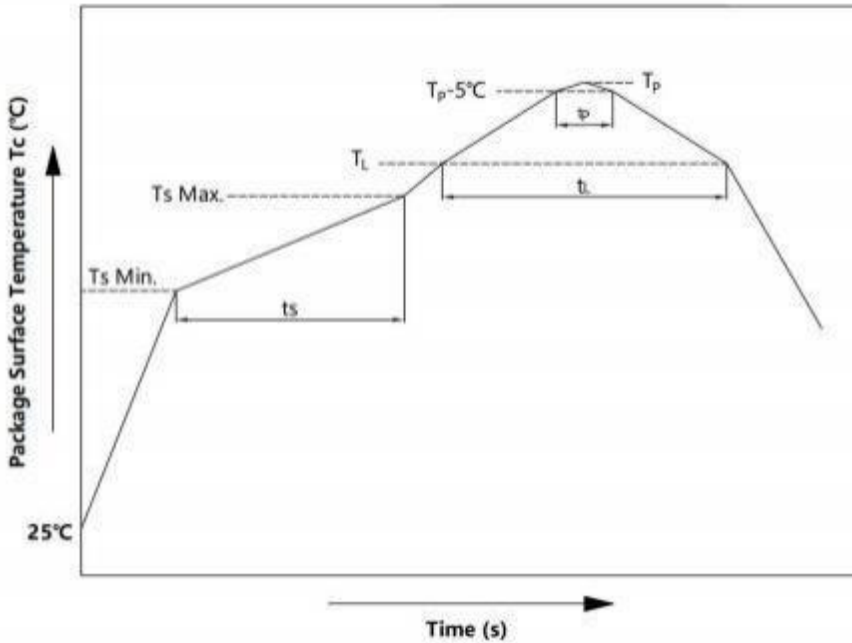
建议焊盘布局 Recommended pad Layout



单位 Unit: mm

注：上图为产品正视图。

Note: The picture above is the front view of the product.

**回流焊温度曲线图 solderReflowprofile**


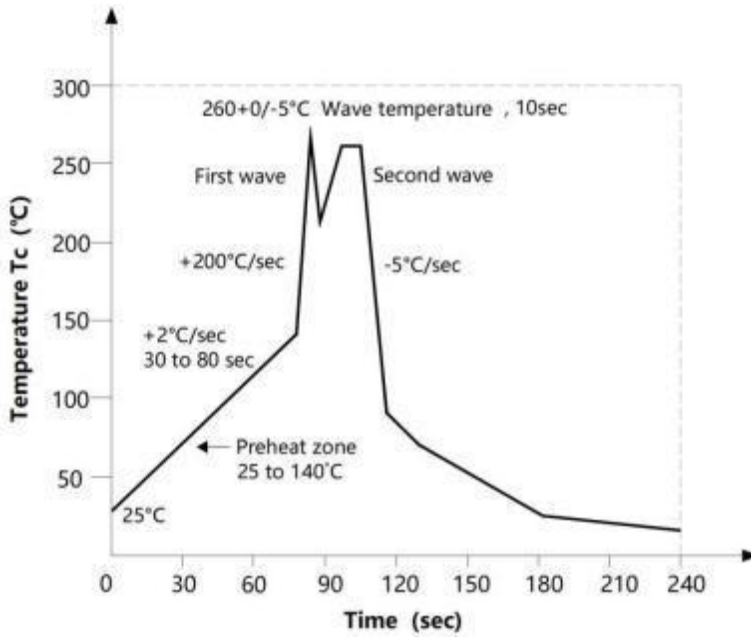
项目 Item	符号 Symbol	最小值 Min.	最大值 Max	单位 Unit
预热温度 Preheat Temperature	Ts	150	200	°C
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (TL to TP)	-	-	3	°C/s
液相线温度 Liquidus Temperature	TL	217		°C
时间高于 TL Time Above TL	tl	60	150	s
峰值温度 Peak Temperature	TP	-	260	°C
Tc在(TP -5)和 TP 之间的时间 Time During Which Tc Is Between (TP -5) and TP	tp	-	30	s
降温速率 Ramp-down Rate(TP to TL)	-	-	6	°C/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;

## 波峰焊温度曲线图 wavesoldering 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  $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ，时间  $\leq 3\text{s}$ 。  
Hand soldering iron requirements：Temperature：  $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$ , within 3s.

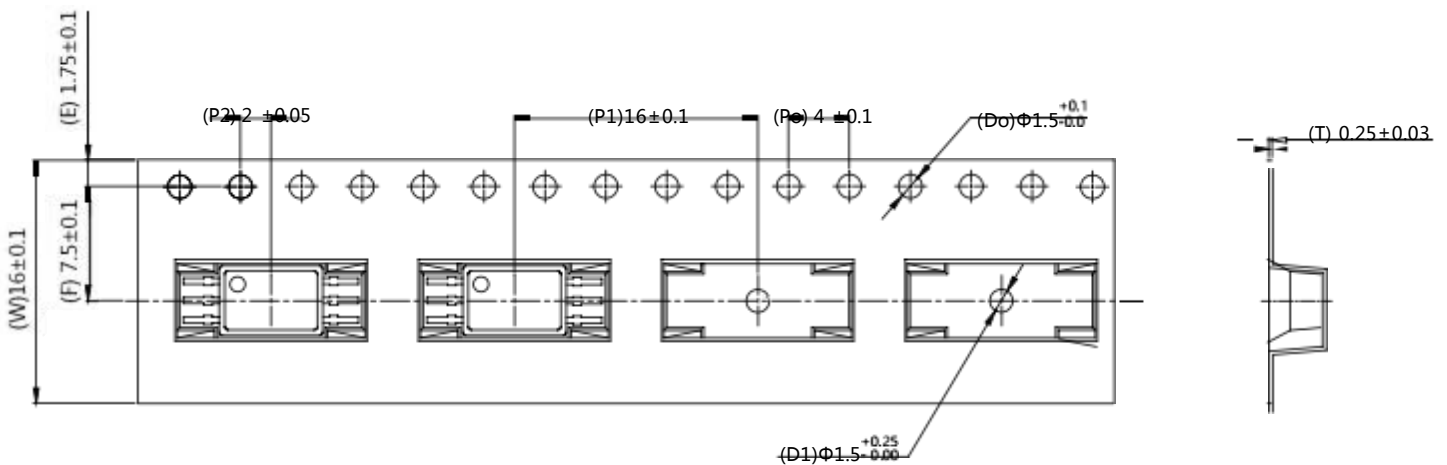
## 包装 packing

### ■ 汇总表summaytable

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
SOP6	卷盘 ( $\phi 330\text{mm}$ 蓝盘)	1千只/盘	2盘/盒	10盒/箱	450*390*0.1mm	340*60*340mm	620*360*365mm	首尾端空至少200mm
Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
SOP6	Reel( $\phi 330\text{mm}$ Blue)	1k pcs/reel	2Reel/box	10box/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：1000只。  
Qty/reel：1000 pcs.
- 2) 每箱数量：20000只。  
Qty/ctn：20000 pcs.
- 3) 内包装：每卷盘1000只。  
Inner packing：1000pcs/reel.
- 4) 示意图 Schematic：



单位 Unit：mm

## 注意 Attention

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