



达林顿光耦
Darlington
Optocouplerr

AT452

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

AT452是一款由发光二极管和达林顿晶体管组成的高耐压($V_{CE0} \geq 350V$)光电耦合器。四引脚封装 (SOP4)。
 The AT452 is a photoelectric coupler composed of light-emitting diode and darlington transistor. It is packaged in a 4-pin SOP package.

特性 Features

- 电流转换比(CTR)范围: $CTR \geq 1000\%$ ($I_F = 1mA, V_{CE} = 2V, T_a = 25^\circ C$)
 Current transfer ratio: $CTR \geq 1000\%$ ($I_F = 1mA, V_{CE} = 2V, T_a = 25^\circ C$)
- 输入-输出隔离电压 ($V_{ISO} = 3750 \text{ Vrms}$)
 High isolation voltage between input and output($V_{ISO} = 3750 \text{ Vrms}$)
- 爬电距离 $\geq 5mm$
 Creepage distance $\geq 5mm$
- 外部电气间隙 $\geq 5mm$
 External electrical clearance $\geq 5m$
- $DIT \geq 0.4mm$

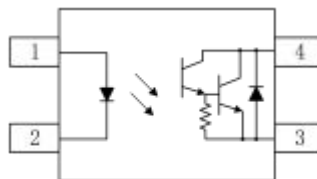
应用 Applications

- 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



SOP4



Pin Configuration



- 1. Anode
- 2. Cathode
- 3. Emitter
- 4. Collector

产品型号命名规则 Order Code
AT 452 - 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 (452 : 452)
- 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(特殊范围需填写或者空白 Special Range or None)
- 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 “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 the day of the week
- 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	≥5	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	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/DIN EN60747-5-5
瞬态隔离电压 Transient isolation voltage	V _{IOTM}	5000	V _{peak}	DIN/EN/DIN EN60747-5-5
隔离电压 Isolation Voltage	V _{iso}	> 3750	V _{rms}	For 1 min, RH < 60%

极限参数 Absolute Maximum Ratings (TA = 25°C)

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	60	mA
	反向电压 Reverse Voltage	V _R	6	V
	峰值正向电流(1us, 脉冲) Peak forward current (1us, pulse)	I _{FP}	1000	mA
	功耗 Power Dissipation	P _D	100	mW
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	150	mA
	集电极-发射极电压 Collector-Emitter Voltage	V _{CEO}	350	V
	发射极-集电极电压 Emitter-Collector Voltage	V _{ECO}	0.1	V
总功耗 Total Power Dissipation		P _{tot}	170	mW
隔离电压 Isolation Voltage		V _{iso}	3750	V _{rms}
工作温度 Operating Temperature		T _{opr}	-55~+110	°C
存储温度 Storage Temperature		T _{stg}	-55~+125	°C
焊接温度 Soldering Temperature		T _{sol}	260	°C

产品特性参数 Electro-optical Characteristics (T_A = 25°C)

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	-	1.2	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	-	50	-	pF
接收端 Output	集电极暗电流 Collector Dark Current	I _{CEO}	V _{CE} = 200V	-	-	100	nA
	集电极-基极击穿电压 Collector-Base Breakdown Voltage	BV _{CEO}	I _C = 0.1mA, I _F = 0	350	-	-	V
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage	BV _{ECO}	I _E = 0.01mA, I _F = 0	0.1	-	-	V
传输特性 Transfer Characteristics	电流传输比 Current Transfer Ratio	CTR*	I _F = 1mA, V _{CE} = 2V	1000	-	-	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage	V _{CE(sat)}	I _F = 20mA, I _C = 100mA	-	1.2	1.5	V
	隔离电阻 Isolation Resistance	R _{ISO}	DC = 500V 40 ~ 60% R.H.	5 × 10 ¹⁰	1 × 10 ¹¹	-	Ω
	隔离电容 Isolation capacitance	C _{ISO}	V = 0, F = 1MHz	-	0.6	-	pF
	截止频率 Cut-off frequency	F _C	V _{CE} = 5V, I _C = 2mA, R _L = 100Ω, -3dB	-	7	-	KHz
	上升时间 Rise Time	T _r	V _{CE} = 2V, I _C = 10mA, R _L = 100Ω	-	80	250	μs
下降时间 Fall Time	T _f	-		20	100	μs	

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

Fig.1 Relative Current Transfer Ratio vs. Forward Current

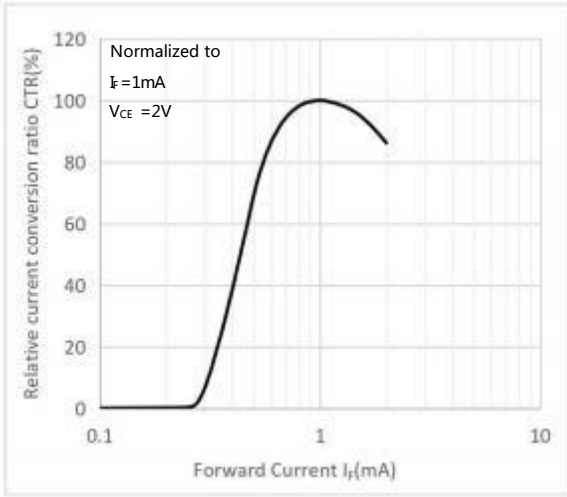


Fig.2 Forward Current vs. Forward Voltage

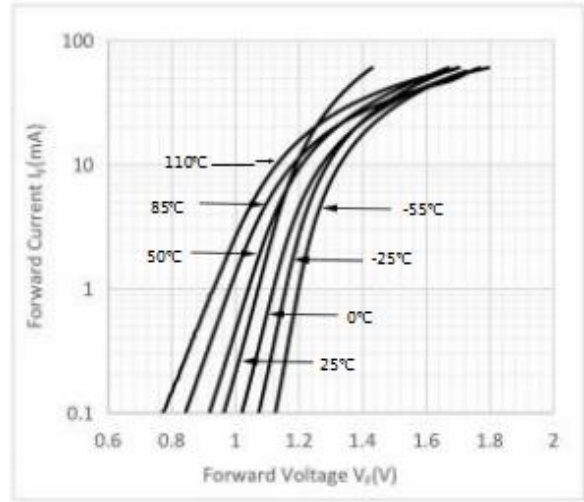


Fig.3 Collector Current vs. Collector-emitter Voltage

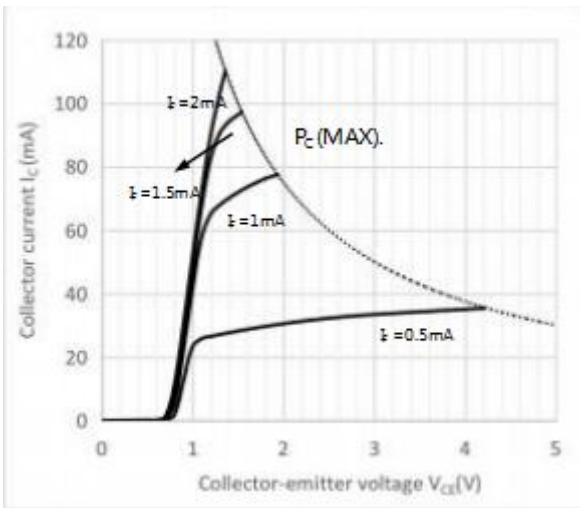


Fig.4 Relative Current Transfer Ratio vs. Ambient Temperature

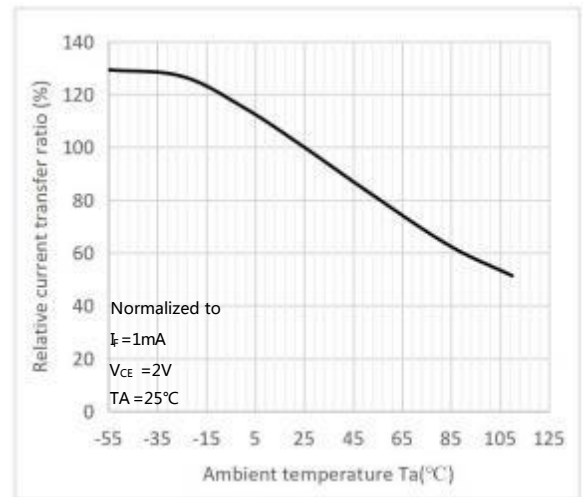


Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

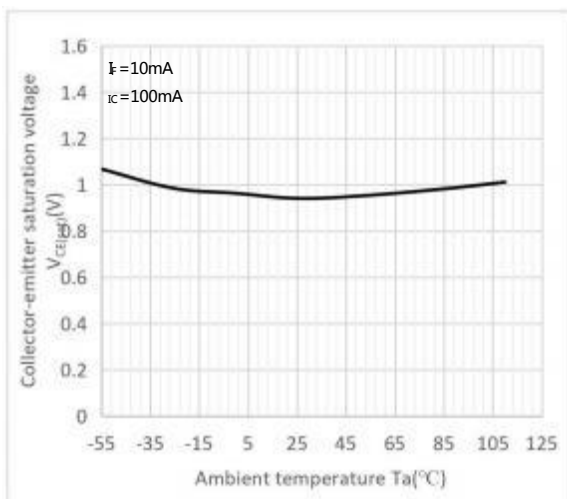


Fig.6 Collector Dark Current vs Ambient Temperature

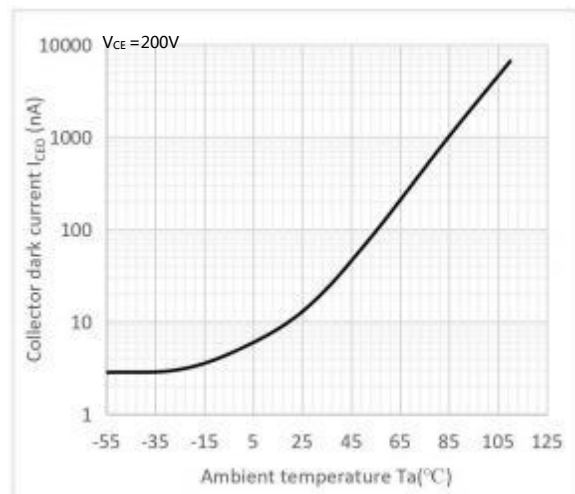


Fig.7 Response Time vs. Load Resistance

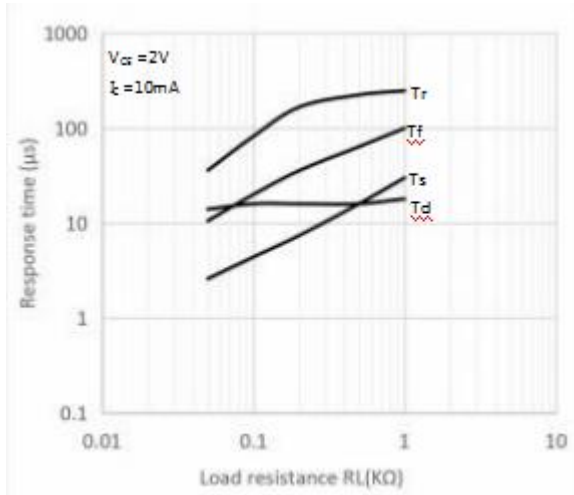


Fig.8 Response Time vs. Load Resistance

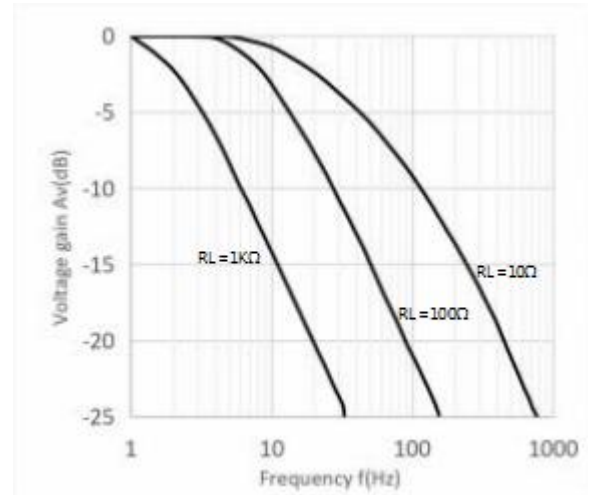


Fig.9 Collector-emitter Saturation Voltage vs Forward Current

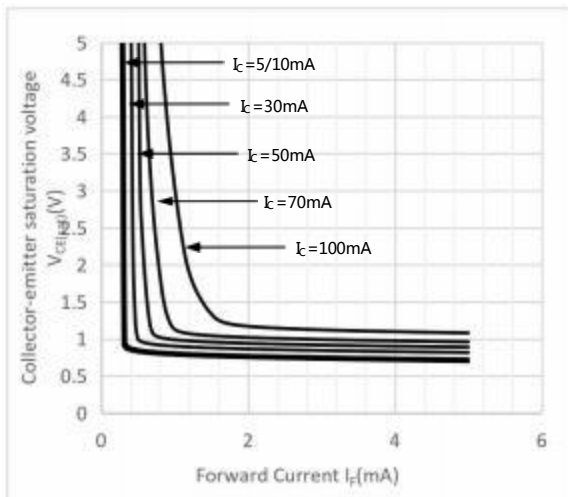
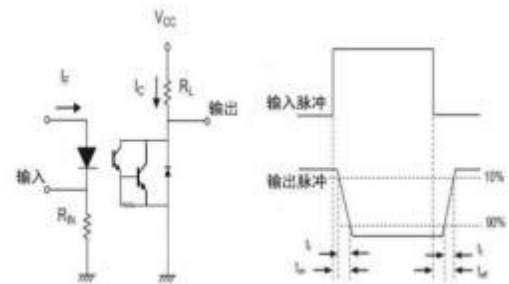
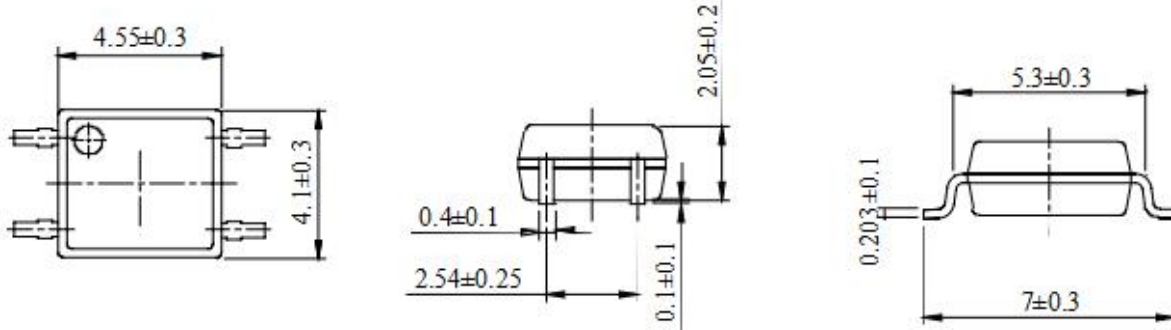


Fig.10 Switching Time Test Circuit & Waveforms



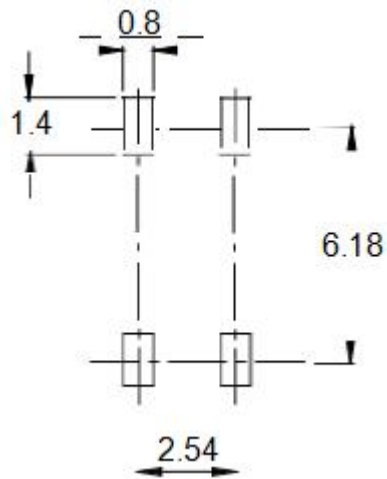
外形尺寸 Outline Dimensions

SOP4



单位 Unit: mm

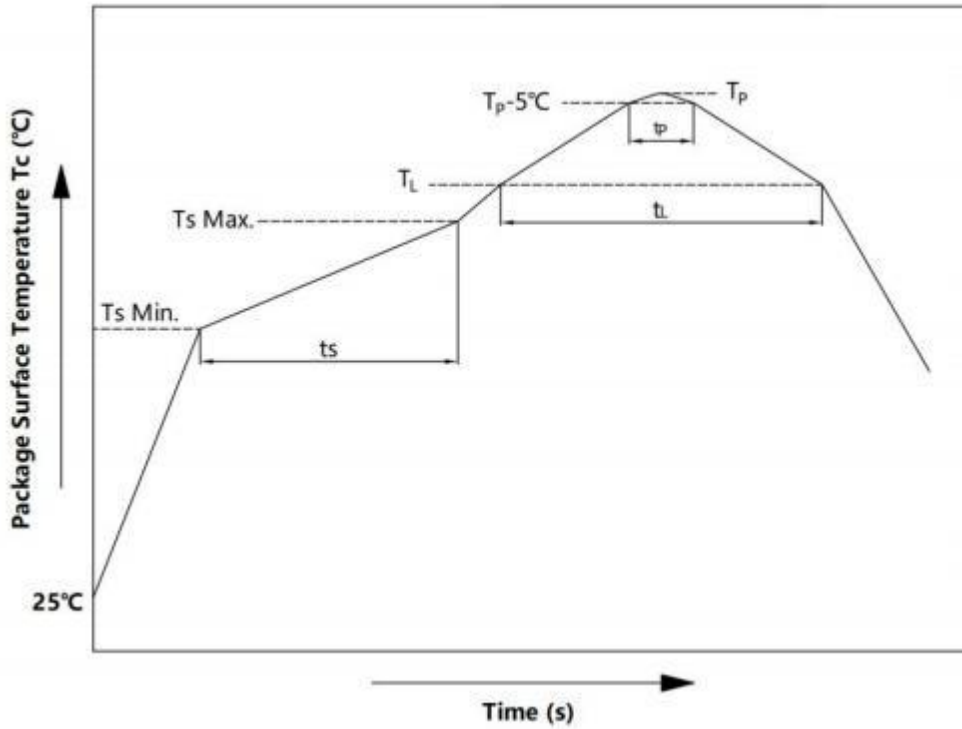
建议焊盘布局 Recommended Pad Layout



单位 Unit: mm

注：上图为产品正视图。

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

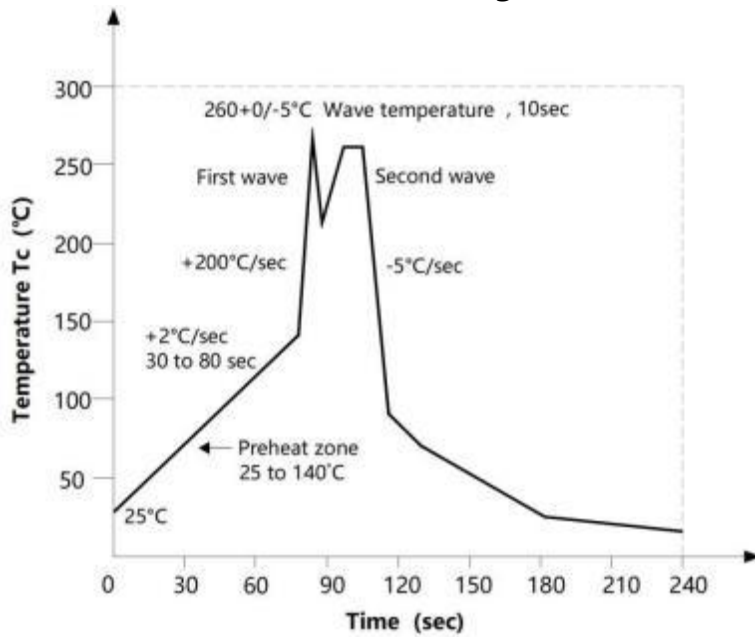
回流焊温度曲线图 Solder Reflow Profile


项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	T_s	150	200	°C
预热时间 Preheat Time	t_s	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	°C/s
液相线温度 Liquidus Temperature	T_L	217		°C
时间高于 T_L Time Above T_L	t_l	60	150	s
峰值温度 Peak Temperature	T_P	-	260	°C
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	°C/s

注：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。

Note: Reflow soldering is recommended at the temperatures and times shown, no more than three times.

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 $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$ ，时间 $\leq 3\text{s}$ 。
Manual soldering method Temperature: $360^{\circ}\text{C} \pm 5^{\circ}\text{C}$, within 3s.

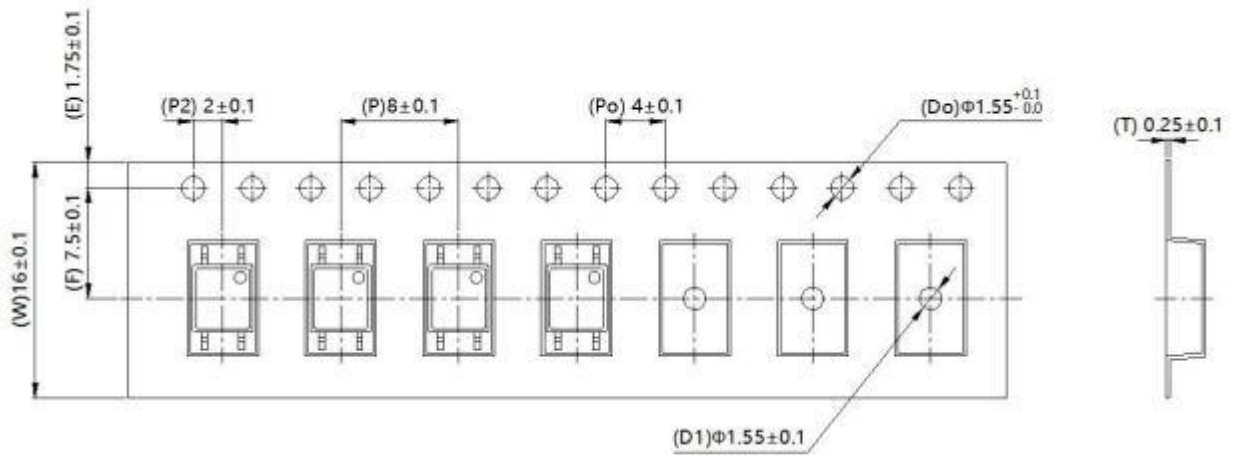
包装 Packing

■ 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
SOP4	卷盘 ($\phi 330\text{mm}$ 蓝盘)	3000 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
SOP4	Reel ($\phi 330\text{mm}$ Blue)	3000 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

注意 Attention

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