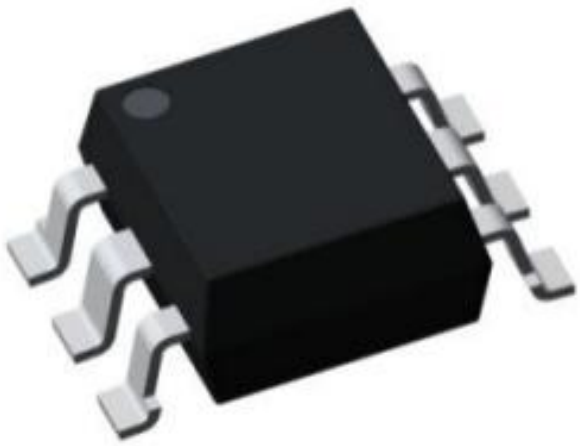
AOTE
SEMICONDUCTOR



晶体管光耦
Photo Transistor

AT4NXX

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

AT4NXX是一款由发光二极管和一个光电晶体管组成的光电耦合器。六引脚封装（DIP6、SMD6）。
The AT4NXX is a photoelectric coupler composed of light-emitting diode and phototransistor. It is packaged in a 6-pin package at DIP、SMD.

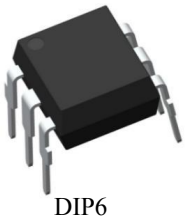
特性 Features

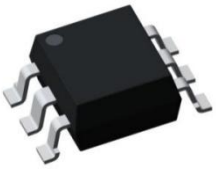
. 电流转换比(CTR)范围: ≥20% (I_F=10mA, V_{CE}=10V, Ta=25℃) Current transfer ratio:≥20% (I_F=10mA, V_{CE}=10V, Ta=25℃)
. 输入-输出隔离电压 (V_{ISO}=5000 Vrms) High isolation voltage between input and output(V_{ISO}=5000 Vrms)
. 输入-输出隔离电阻 (典型值 Riso=$10^{11}\Omega$) Input-output isolation voltage resistance (Riso=$10^{11}\Omega$)
. 工作温度：-55℃~100℃ Operating Temperature: -55℃~100℃
. 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

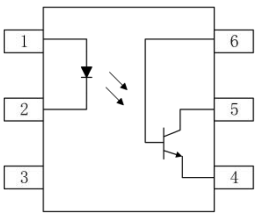
应用 Applications

. 电源调节器 Power regulator
. 数字逻辑输入 Digital logic input
. 微处理器输入 Microprocessor input

封装和原理图 Package and Schematic Diagram


DIP6


SMD6



Pin Configuration
1. Anode
2. Cathode
3.NC
4. Emitter
5. Collector
6.Base

产品型号命名规则 Order Code

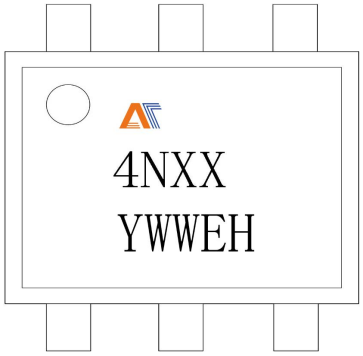
AT 4NXX - UN Y - W (V) (ZZ)

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: 25, 26, 27,28,35,36,37,38）
③ 框架类型 Lead Frame（Cu: 铜框架 Copper）
④ 树脂类型 Epoxy（H: 无卤 Halogen-free）
⑤ 封装形式 Package（D: DIP；S: SMD）
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 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
- 印字中的“XX”代表产品分档：25, 26, 27,28,35,36,37,38
  “XX” denotes the classification：25, 26, 27,28,35,36,37,38
- 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	>7.0	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	>7.0	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， RH < 60%

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	60	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	100	mW
接收端 output	集电极功耗 Collector Power Dissipation	P_C	300	mW
	集电极电流 Collector Current	I_C	100	mA
	集电极-基极电压 Collector-Base Voltage	V_{CBO}	70	V
	集电极-发射极电压 Collector-Emitter Voltage	V_{CEO}	30	V
	发射电极-集电压 Emitter - Collector Voltage	V_{ECO}	7	V
总功耗 Total Power Dissipation		Ptot	350	mW
输入输出瞬时耐受电压 Input-output isolation voltage		Viso	5000	Vrms
工作温度 Operating Temperature		T_{opr}	-55～+100	℃
存储温度 Storage Temperature		T_{stg}	-55～+125	℃
焊接温度 Soldering Temperature		T_{sol}	260	℃

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	-	1.2	1.5	V
	反向电流 Reverse Current		I_R	V_R=3V	-	-	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}=10V	-	-	50	nA
	集电极-基极击穿电压 Collector-Base Breakdown Voltage		BV_{CBO}	I_B=0.1mA, I_F=0	70	-	-	V
	集电极-发射极击穿电压 Collector-Emitter Breakdown Voltage		BV_{CEO}	I_C=0.1mA, I_F=0	30	-	-	V
	发射极-集电极击穿电压 Emitter-Collector Breakdown 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	4N25、4N26、4N38	CTR*	I_F=10mA ,V_{CE}=10V	20	-	-	%
		4N27、4N28			10	-	-	%
		4N35、4N36、4N37			100	-	-	%
	集电极-发射极饱和压降 Collector-Emitter Saturation Voltage		$V_{CE(sat)}$	I_F=50mA,I_C=2mA	-	-	0.3	V
	隔离电阻 Isolation Resistance		R_{ISO}	DC=500V 40~60%R.H.	$5x10^{10}$	$1x10^{11}$	-	Ω
	隔离电容 Isolation capacitance		C_{ISO}	V=0,F=1MHz	-	1	2.5	pF
	上升时间 Rise Time		T_r	V_{CE}=10V, I_C=2mA, R_L=100Ω	-	4	-	μs
	下降时间 Fall Time		T_f		-	3	-	μs

注*： 电流传输比=I_C/I_F x 100%。

Note*： CTR=I_C/I_F x 100%.

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

Fig.1 Relative Current Transfer Ratio vs. Forward Current

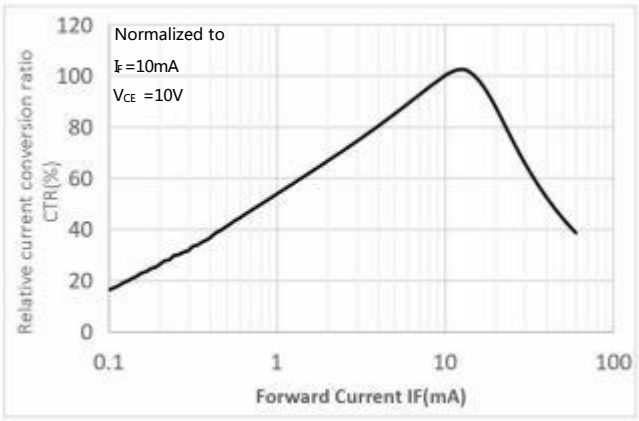


Fig.2 Forward Current vs. Forward Voltage

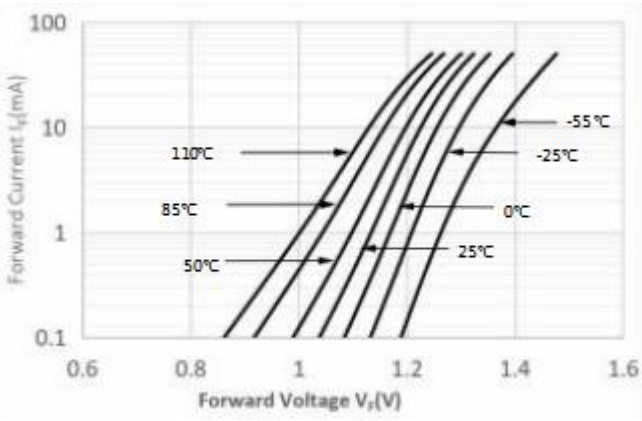


Fig.3 Collector Current vs. Collector-emitter Voltage

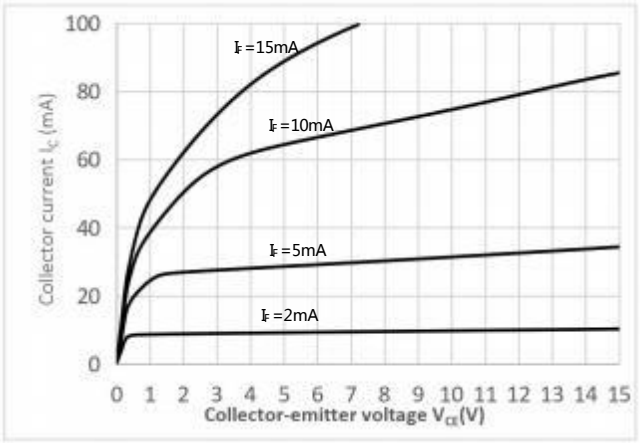


Fig.4 Relative Current Transfer Ratio vs.Ambient Temperature

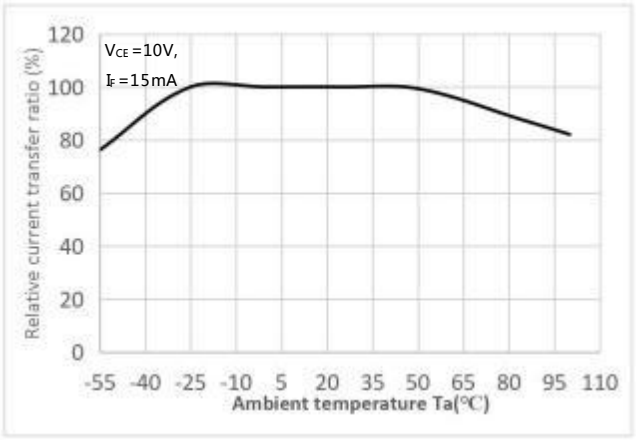


Fig.5 Collector Dark Current vs Ambient Temperature

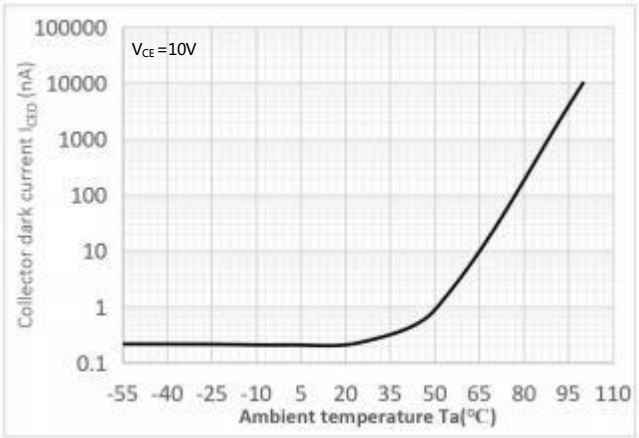


Fig.6 Response Time vs. Load Resistance

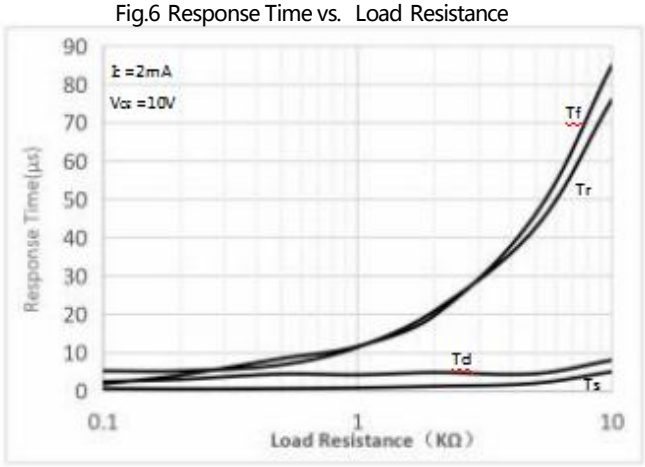


Fig.7 Frequency Response

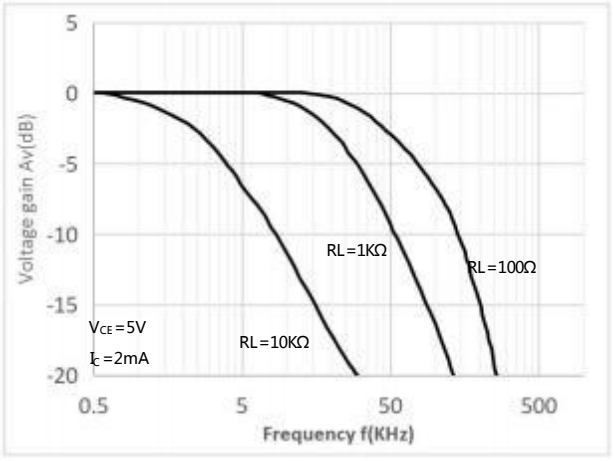


Fig.8 Collector-emitter Saturation Voltage vs Forward Current

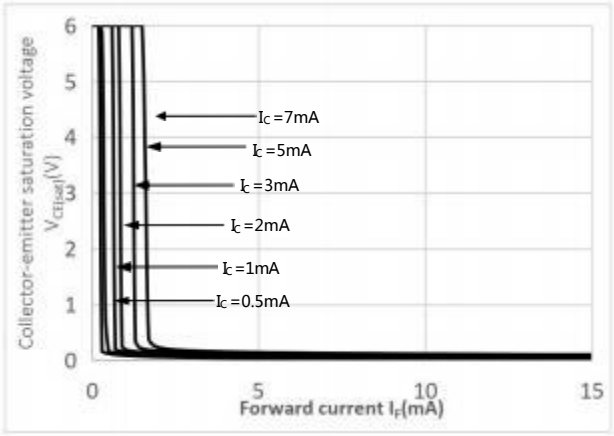
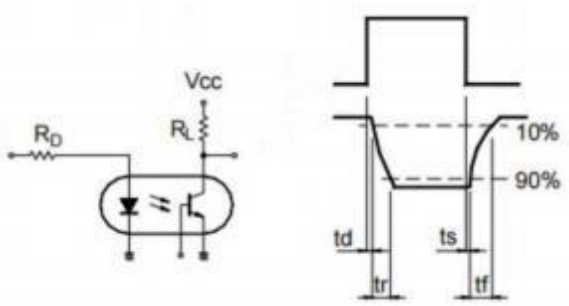
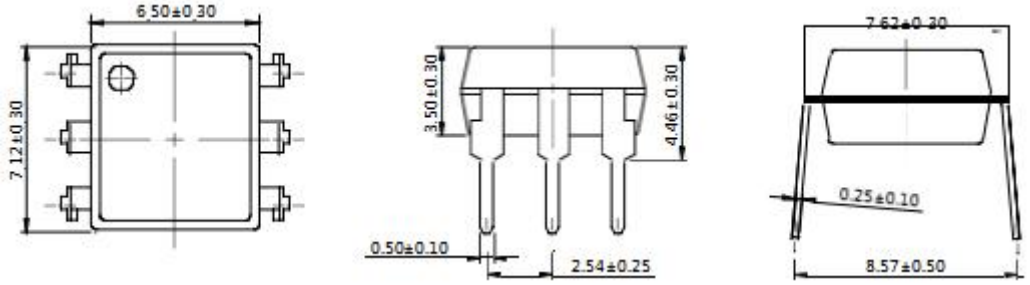


Fig.9 Switching Time Test Circuit & Waveforms

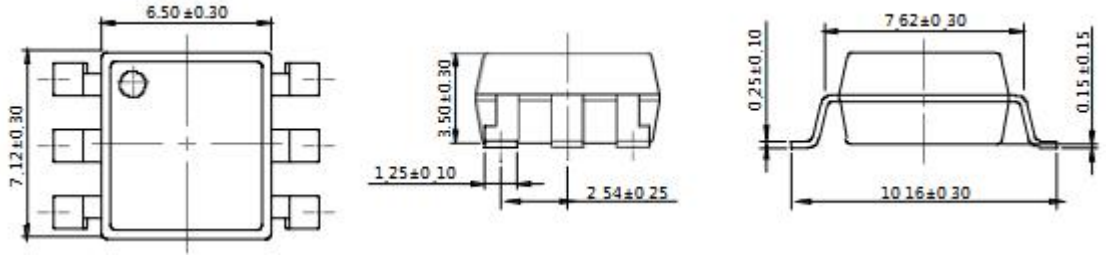


外形尺寸 Outline Dimensions

DIP6

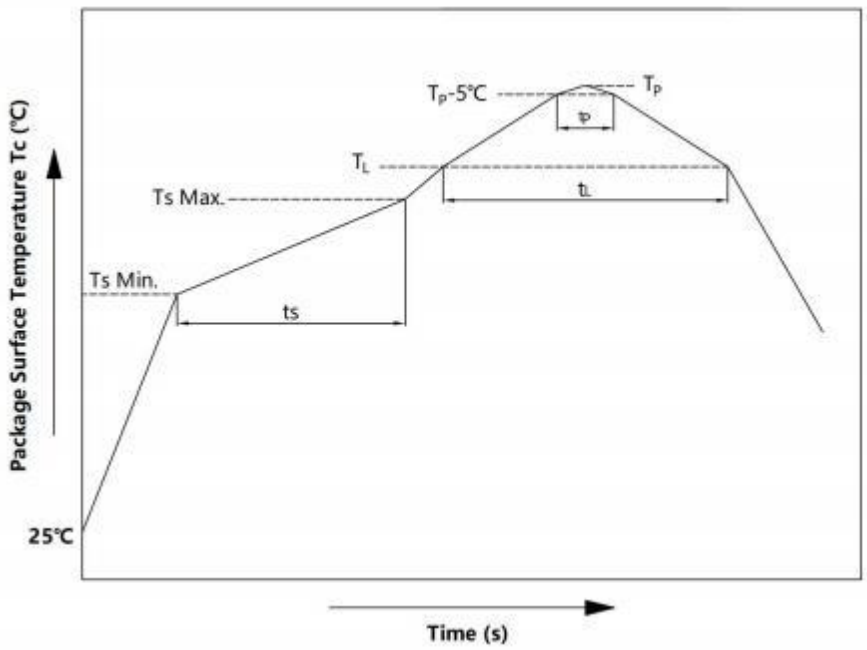


SMD6



单位 Unit: mm

回流焊温度曲线图 Solder Reflow Profile



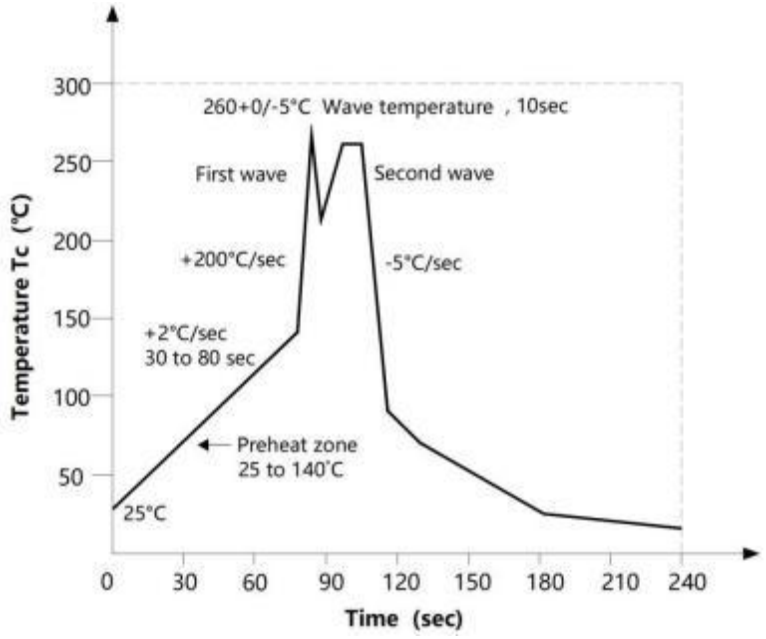
项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	Ts	150	200	℃
预热时间 Preheat Time	ts	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
时间高于 T_L Time Above T_L	t_L	60	150	s
峰值温度 Peak Temperature	T_P	-	260	℃
Tc 在(T_P-5)和 T_P之间的时间 Time During Which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

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。
Manual soldering method Temperature: 360℃ ± 5℃, within 3s.

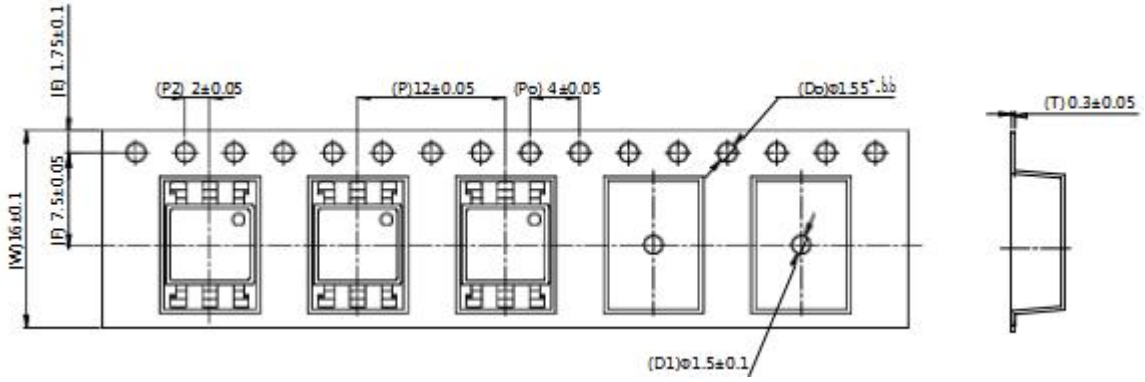
包装 Packing

■ 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
SMD6	卷盘 (ϕ330mm 蓝盘)	1000 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
DIP6	管装 (500*12*11mm)	65 只/管	50 管/盒	10 盒/箱	不适用	525*128*56mm	535*275*300mm	每管使用蓝白胶塞，方向须一致
Package Type	**Packing Form**	**Quantity per Reel**	**Quantity per Box**	**Quantity per Carton**	**Antistatic Bag Specification**	**Box Specification**	**Carton Specification**	**Note**
SMD6	Reel (ϕ330mm Blue)	1000 pcs/reel	2 reels/box	10 boxes/ctn	450*390*0.1mm	340*60*340mm	620*360*365mm	Guard band 200mm min.
DIP6	Tube (500*12*11mm)	65 pcs /tube	50 tubes/box	10 boxes/ctn	NA	525*128*56mm	535*275*300mm	Endplug (blue) and Endplug (white) keep the direction

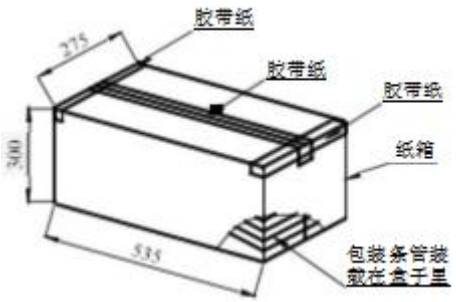
■ 编带包装 Tape & Reel

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 ：每盒 2 盘。
   Inner packing：2 reels/box.
4) 示意图 Schematic：



■ 管条包装 Tape & Tube

1) 每管数量：65 只。
   Qty/Tube：65 pcs.
2) 每箱数量：32500 只。
   Qty/ctn：32500 pcs.
3) 内包装 ：每盒 50 管。
   Inner packing：50 Tube/box.
   4 ）示意图 Schematic



单位/Unit： mm

注意 Attention

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