NQUNXIN
群芯微电子

中国芯 光电梦

光继电器

Photo Relay

QX416

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

QX416 光继电器由红外发光二极管和光电发生器、MOSFET 耦合组成。
The QX416 Photo relay consist of a photo MOSFET、Photovoltage generator、infrared LED.

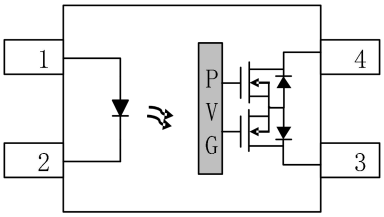
特性 Features

- 常闭,单刀单掷
  Normally closed (SPST)
- 控制 600V 交流或直流电压
  Control 600V AC or DC voltage
- 开关 20mA 负载
  Switch 20mA load
- 控制低电平模拟信号
  Controls low-level analog signal
- 高灵敏度，低导通电阻
  High sensitivity, low on-resistance
- 低电平断态漏电流
  Low-level off state leakage current
- 高隔离电压 5000V_{rms}
  High isolation voltage 5000V_{rms}
- 无铅，符合 RoHS 标准
  Lead free, meet RoHS standards

应用 Applications

- 通讯产品(个人电脑,笔记本电脑)
  Communications products (Personal computers, Laptops)
- 调制解调器/传感器
  Modem/Sensor
- 移动电话 /安全设备
  Mobile phones/Security equipment
- 测量和测试设备
  Measuring and Testing equipment
- 工厂自动化设备
  Plant automation equipment
- 高速检验机器
  High-speed inspection machines

封装和原理图 Package and Schematic Diagram



Pin Configuration
1. Anode
2. Cathode
3.4. Drain

产品型号命名规则 Order Code

QX 416 - UN Y - W (V) (ZZ)

① ② ③ ④ ⑤ ⑥ ⑦

① 公司代码 Company Code（QX: 群芯 Qunxin）
② 产品系列 Product Series（416：416）
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（D: DIP; S: SMD; ）
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 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"◔"为群芯品牌 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
- 印字中的"V"代表产品特殊标识：A~Z 或空白
  "V"denotes Product special code： A~Z or None

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	V_{ISO}	5000	V_{rms}	For 1 minute.

极限参数 Absolute Maximum Ratings (T_A=25℃)

参数 Parameter		符号 Symbol	额定值 Rating	单位 Unit
发射端 Input	LED 正向电流 LED Forward Current	I_F	50	mA
	LED 反向电压 LED Reverse Voltage	V_R	5	V
	峰值正向电流 Peak Forward Current	I_{FP}	1	A
	输入功率 Power Dissipation	P_{in}	75	mW
接收端 Output	负载电压(AC 峰值) Load Voltage (Peak AC)	V_L	600	V
	持续负载电流 Continuous Load Current	I_L	0.04	A
	峰值负载电流 Peak Load Current	I_{peak}	0.12	A
	输出功率 Power Dissipation	P_{out}	500	mW
输入输出瞬时耐受电压 Isolation Voltage		V_{ISO}	5000	V_{rms}
工作温度 Operating Temperature		T_{opr}	-40~+85	℃
存储温度 Storage Temperature		T_{stg}	-40~+100	℃
焊接温度 Soldering Temperature		T_{sol}	260	℃

产品特性参数 Electro-optical Characteristics (T_A=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	LED 动作(关闭)电流 LED Operate (OFF) Current	I_{Foff}	I_L = 0.04A	-	1	3	mA
	LED 复位(开启)电流 LED Reverse (ON) Current	I_{Fon}	I_L = 0.04A	0.1	0.9	-	mA
	LED 正向压降 LED Dropout Voltage	V_F	I_F=5mA	-	1.3	1.5	V
接收端 Output	导通电阻 On Resistance	R_{on}	I_F = 0mA , I_L = 0.04A Within 1s on time	-	130	260	Ω
	关断漏电 Off State Leakage Current	I_{Leak}	I_F = 5mA V_L= 600V	-	-	10	uA
传输特性 Transfer Characteristics	动作(关闭)时间 Operate (OFF) Time	T_{off}	I_F = 0mA→5mA I_L = 0.04A	-	20	2000	us
	复位(开启)时间 Turn Off Time	T_{on}	I_F = 5mA→0mA I_L = 0.04A	-	200	1000	us
	I/O 电容 I/O Capacitance	C_{ISO}	f = 1 MHz V_B =0V	-	0.8	1.5	pF
	初始 I/O 隔离电阻 Initial I/O Isolation Resistance	R_{ISO}	500 V DC	1000	-	-	MΩ

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

Fig.1 LED Dropout Voltage vs. Ambient Temperature

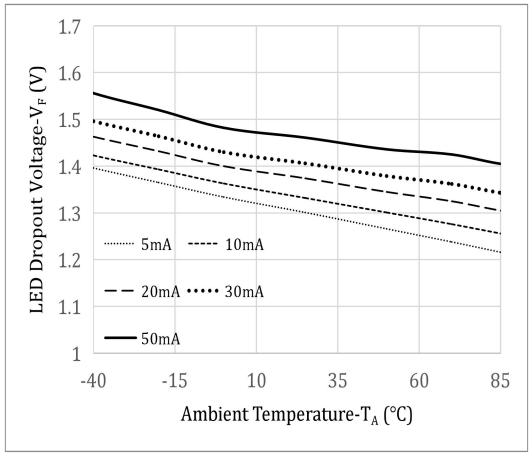


Fig.2 Output Current vs. Output Voltage

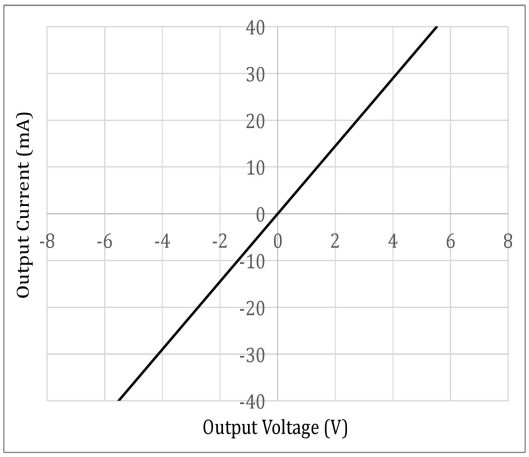


Fig.3 On Resistance vs. Ambient Temperature

I_L=0.04A

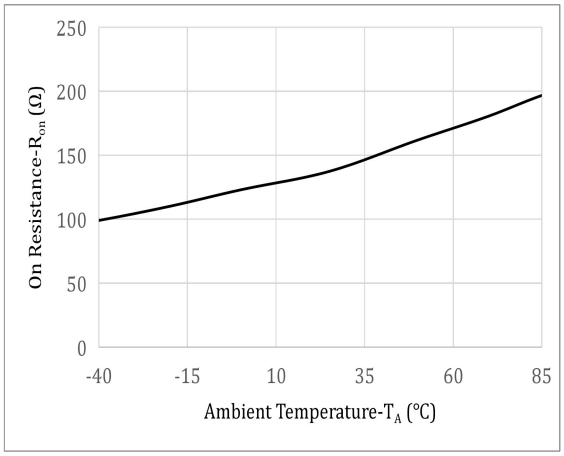


Fig.4 Load Current vs. Ambient Temperature

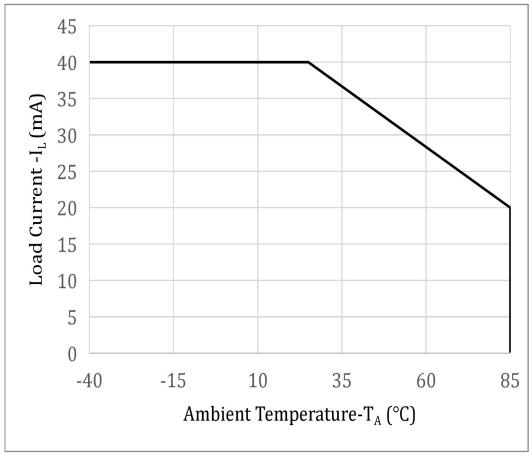


Fig.5 LED Operate (OFF) Current vs. Ambient Temperature

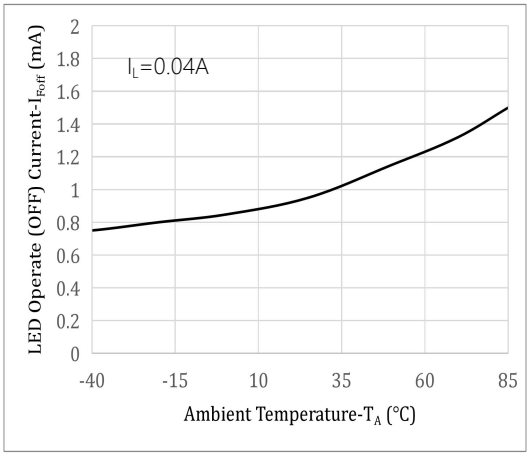


Fig.6 LED Reverse (ON) Current vs. Ambient Temperature

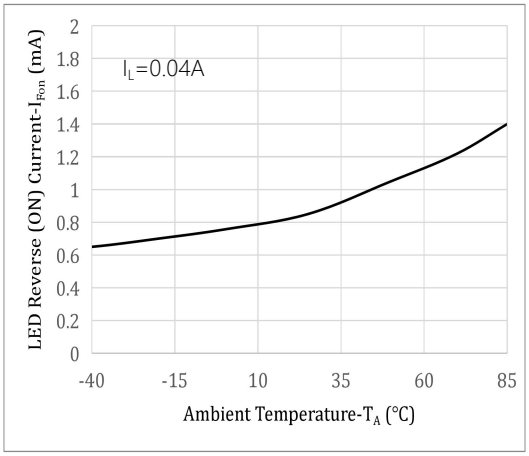


Fig.7 Operate (OFF) Time vs. Ambient Temperature

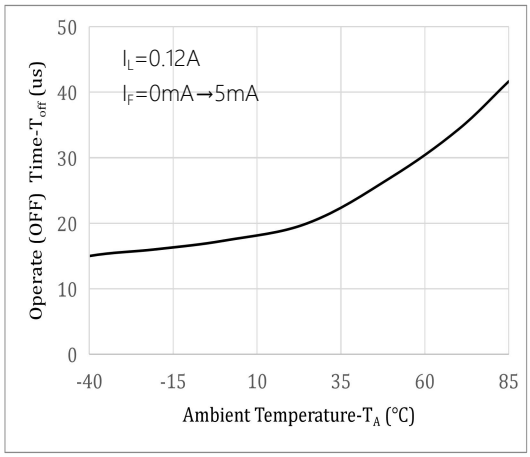


Fig.8 Reverse (ON) Time vs. Ambient Temperature

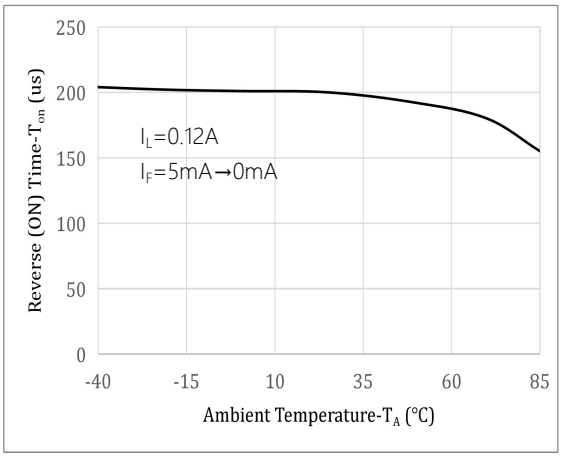


Fig.9 Operate (OFF) Time vs. LED Forward Current

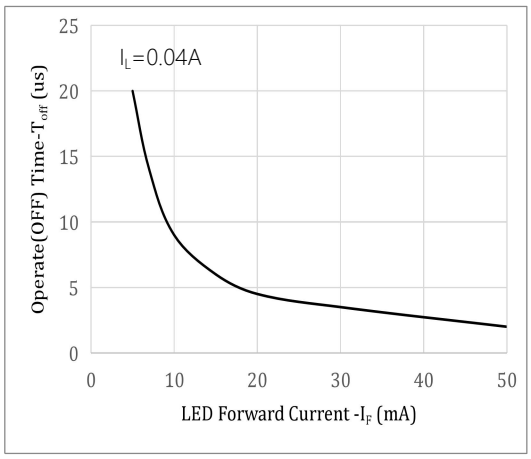


Fig.10 Reverse (ON) Time vs. LED Forward Current

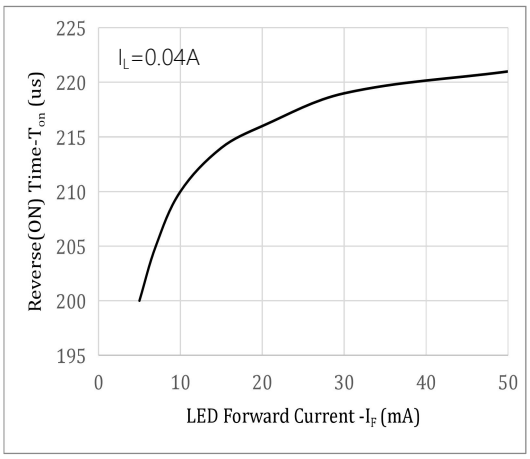
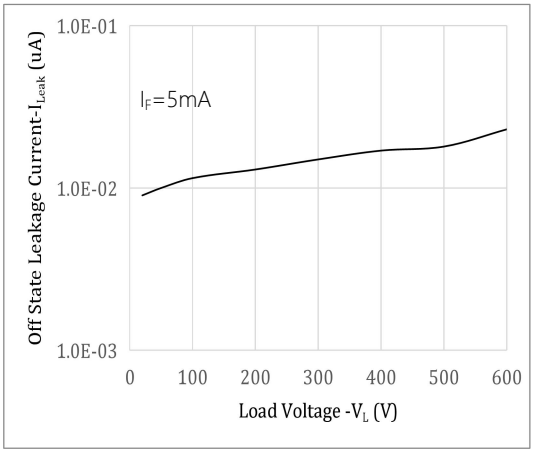
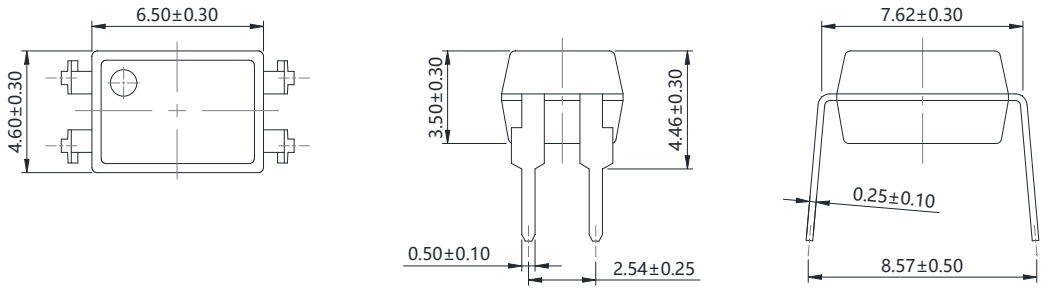


Fig.11 Off State Leakage Current vs Load Voltage



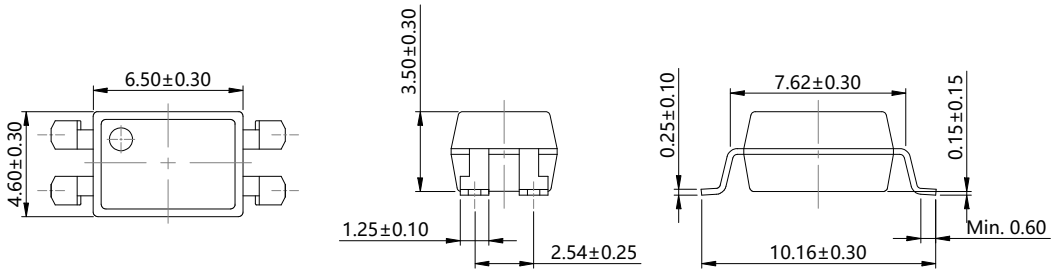
外形尺寸 Outline Dimensions

DIP4



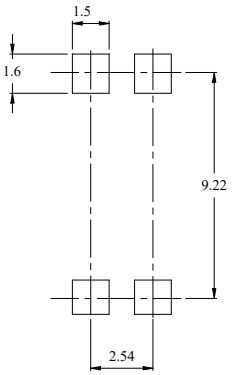
单位 Unit: mm

SMD4



单位 Unit: mm

建议焊盘布局 Recommended Pad Layout

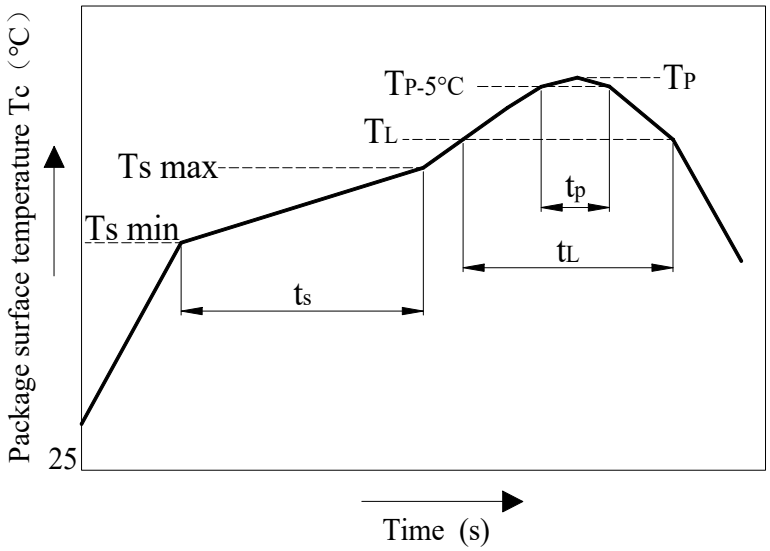


SMD4

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

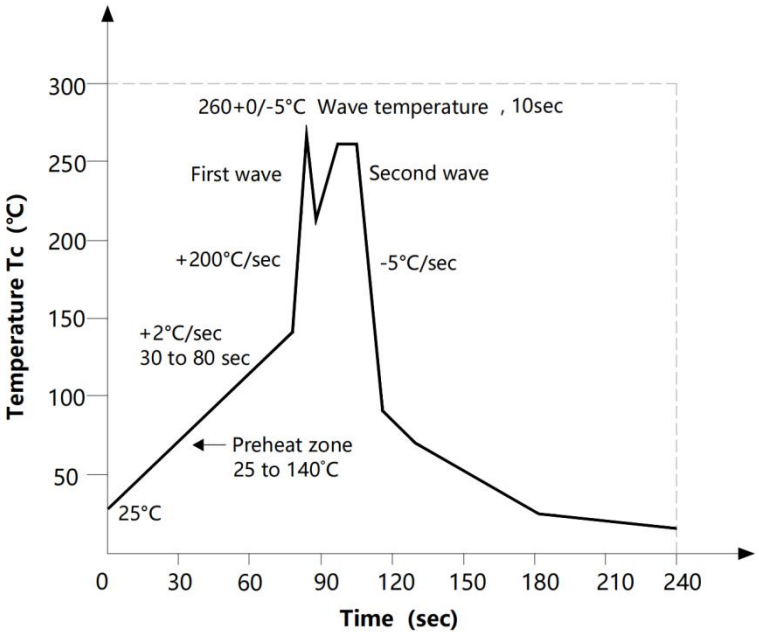


项目 Item	符号 Symbol	最小值 Min.	最大值 Max.	单位 Unit
预热温度 Preheat Temperature	T_s	150	200	℃
预热时间 Preheat Time	t_s	60	120	s
升温速率 Ramp-Up Rate (T_L to T_P)	-	-	3	℃/s
液相线温度 Liquidus Temperature	T_L	217		℃
时间高于 T_L Time Above T_L	t_L	60	150	s
峰值温度 Peak Temperature	T_P	-	260	℃
T_C 在(T_P-5)和 T_P 之间的时间 Time During Which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

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

包装 Packing

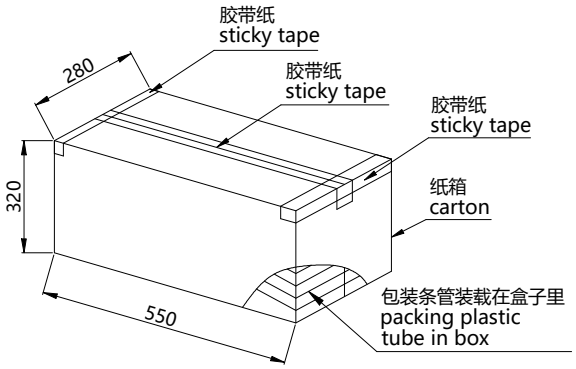
■ 汇总表 Summary table

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
DIP4	管装 (500*12*11mm)	100 只/管	50 管/盒	10 盒/箱	不适用	525*130*57mm	550*280*320mm	每管使用蓝白胶塞，方向须一致
SMD4	卷盘 (ϕ330mm 蓝盘)	2000 只/盘	2 盘/盒	10 盒/箱	450*390*0.1mm	353*340*60mm	650*375*365mm	首端空 50 个空格 末端空 100 个空格

Package Type	Packing Form	Quantity per Reel	Quantity per Box	Quantity per Carton	Antistatic Bag Specification	Box Specification	Carton Specification	Note
DIP4	Tube (500*12*11mm)	100 pcs/tube	50 tubes/box	10 boxes/ctn	NA	525*130*57mm	550*280*320mm	Use blue and white rubber stoppers for each tube, with the same direction
SMD4	Reel (ϕ330mm Blue)	2000 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

■ DIP4 条管包装 Tube

1) 每管数量：100 只。
   Qty/reel：100 pcs.
2) 每箱数量：50000 只。
   Qty/ctn：50000 pcs.
3) 内包装：每盒 50 管。
   Inner packing：50 tubes/box.



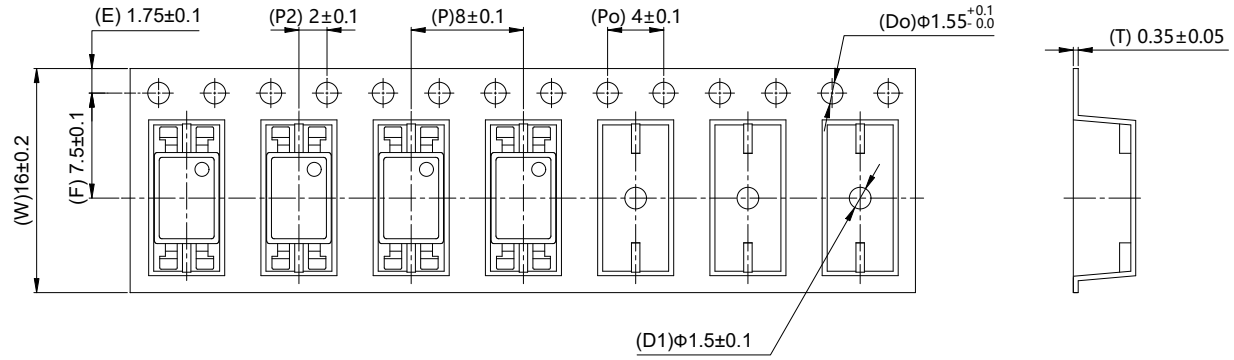
■ SMD4 编带包装 Tape & Reel

4) 每卷数量：2000 只。
Qty/reel：2000 pcs.

5) 每箱数量：40000 只。
Qty/ctn：40000 pcs.

6) 内包装：每盒 2 盘。
Inner packing：2 reels/box.

7) 示意图 Schematic：



单位 Unit：mm

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