NQUNXIN
群芯微电子

中国芯 光电梦

# 达林顿光耦

Darlington Optocoupler

# QX852

宁波群芯微电子股份有限公司
NINGBO QUNXIN MICROELECTRONICS CO., LTD.

中国 浙江省宁波杭州湾新区玉海东路 68 号
68 Yuhaidong Road, Hangzhou Bay New District, Ningbo, Zhejiang, China

# QX852
## Darlington Optocoupler

## 概述 Description

QX852 是一款由发光二极管和达林顿晶体管组成的高耐压(VCEO≥350V)光电耦合器。四引脚封装（DIP4、SMD4、DIP4-M）。
The QX852 is a photoelectric coupler composed of light-emitting diode and darlington transistor.
It is packaged in a 4-pin package at DIP、DIP-M、SMD.

## 特性 Features

- 电流转换比(CTR)范围: CTR≥1000% ($I_F$=1mA, $V_{CE}$=2V, Ta=25℃)
  Current transfer ratio: CTR≥1000% ($I_F$=1mA, $V_{CE}$=2V, 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 )
- 集电极-发射极击穿电压 $BV_{CEO}$≥350V
  Collector-emitter breakdown voltage $BV_{CEO}$≥350V
- 爬电距离≥7mm
  Creepage distance≥7mm
- 外部电气间隙≥7mm
  External electrical clearance≥7m
- DIT≥0.4mm

## 应用 Applications

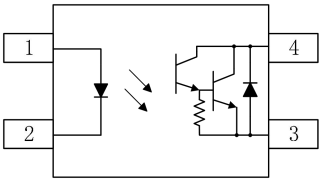
- 开关电源，智能电表
  Switching power supply, intelligent meter
- 工业控制，测量仪器
  Industrial control, measuring instruments
- 办公设备，比如复印机
  Office equipment such as copiers
- 家用电器，比如空调、风扇、热水器等
  Household appliances: such as air conditioners, fans, water heaters, etc.

## 封装和原理图 Package and Schematic Diagram

DIP4

SMD4

DIP4-M




Pin Configuration
1. Anode
2. Cathode
3. Emitter
4. Collector

## 产品型号命名规则 Order Code

**QX 852 - 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（852）
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,M:DIP-M）
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 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<br>Item | 符号<br>Symbol | 数值<br>Value | 单位<br>Unit | 备注<br>Remark |
|---|---|---|---|---|
| 爬电距离<br>Creepage Distance | L | ≥7 | mm | 从输入端到输出端，沿本体最短距离路径<br>Measured from input terminals to output terminals, shortest distance path along body |
| 电气间隙<br>Clearance Distance | L | ≥7 | mm | 从输入端到输出端，通过空气的最短距离<br>Measured from input terminals to output terminals, shortest distance through air |
| 绝缘距离<br>Insulation Thickness | DTI | > 0.4 | mm | 发射器和探测器之间的绝缘厚度<br>Insulation thickness between emitter and detector |
| 峰值隔离电压<br>Peak Isolation Voltage | $V_{IORM}$ | 1500 | $V_{peak}$ | DIN/EN/DIN EN60747-5-5 |
| 瞬态隔离电压<br>Transient isolation voltage | $V_{IOTM}$ | 7000 | $V_{peak}$ | DIN/EN/DIN EN60747-5-5 |
| 隔离电压<br>Isolation Voltage | Viso | > 5000 | Vrms | For 1 min， RH < 60% |

## 极限参数 Absolute Maximum Ratings (Ta=25℃)

| 参数<br>Parameter | | 符号<br>Symbol | 额定值<br>Rating | 单位<br>Unit |
|---|---|---|---|---|
| 发射端<br>Input | 正向电流<br>Forward Current | $I_F$ | 60 | mA |
| | 反向电压<br>Reverse Voltage | $V_R$ | 6 | V |
| | 峰值正向电流(1us，脉冲)<br>Peak forward current (1us, pulse) | $I_{FP}$ | 1000 | mA |
| | 功耗<br>Power Dissipation | $P_D$ | 100 | mW |
| 接收端<br>output | 集电极功耗<br>Collector Power Dissipation | $P_C$ | 300 | mW |
| | 集电极电流<br>Collector Current | $I_C$ | 150 | mA |
| | 集电极-发射极电压<br>Collector-Emitter Voltage | $V_{CEO}$ | 350 | V |
| | 发射极-集电极电压<br>Emitter-Collector Voltage | $V_{ECO}$ | 0.1 | V |
| 总功耗<br>Total Power Dissipation | | Ptot | 320 | mW |
| 隔离电压<br>Isolation Voltage | | Viso | 5000 | Vrms |
| 工作温度<br>Operating Temperature | | $T_{opr}$ | -55~+100 | ℃ |
| 存储温度<br>Storage Temperature | | $T_{stg}$ | -55~+125 | ℃ |
| 焊接温度<br>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 | 1.4 | 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 | - | 30 | 250 | pF |
| 接收端 Output | 集电极暗电流 Collector Dark Current | $I_{CEO}$ | $V_{CE}$=200V | - | - | 200 | 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. | $5x10^{10}$ | $1x10^{11}$ | - | Ω |
| | 隔离电容 Isolation capacitance | $C_{ISO}$ | V=0,F=1MHz | - | 0.6 | 1 | pF |
| | 截止频率 Cut-off frequency | Fc | $V_{CE}$=5V, $I_C$=2mA, RL=100Ω, -3dB | - | 7 | - | KHz |
| | 上升时间 Rise Time | $T_r$ | $V_{CE}$=2V, $I_C$=10mA, $R_L$=100Ω | - | - | 300 | μs |
| | 下降时间 Fall Time | $T_f$ | | - | - | 100 | 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

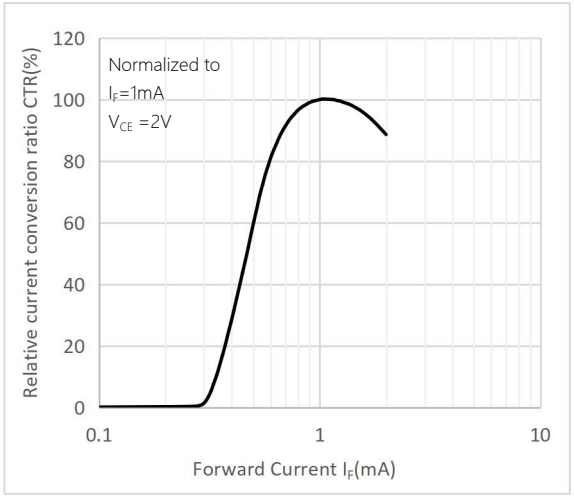



Fig.2 Forward Current vs. Forward Voltage

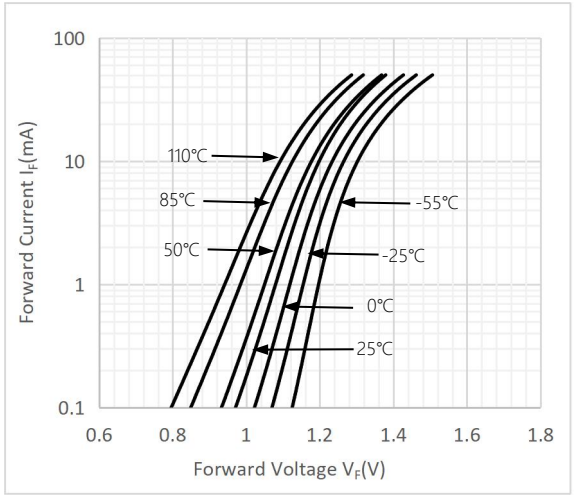



Fig.3 Collector Current vs. Collector-emitter Voltage

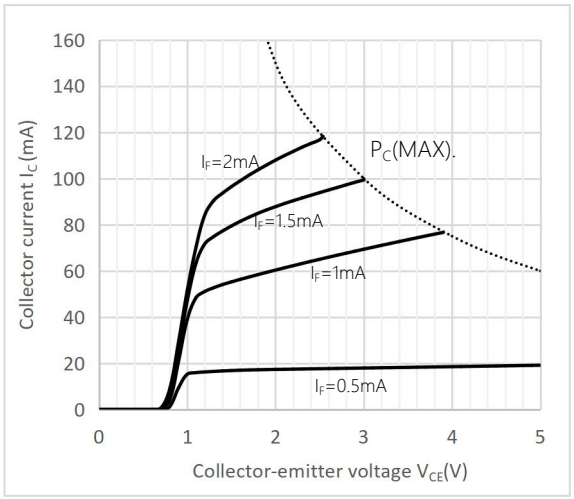



Fig.4 Relative Current Transfer Ratio vs.Ambient Temperature

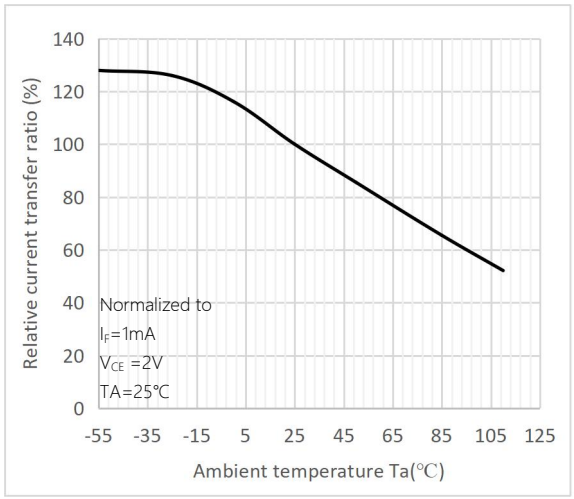



Fig.5 Collector-emitter Saturation Voltage vs. Ambient Temperature

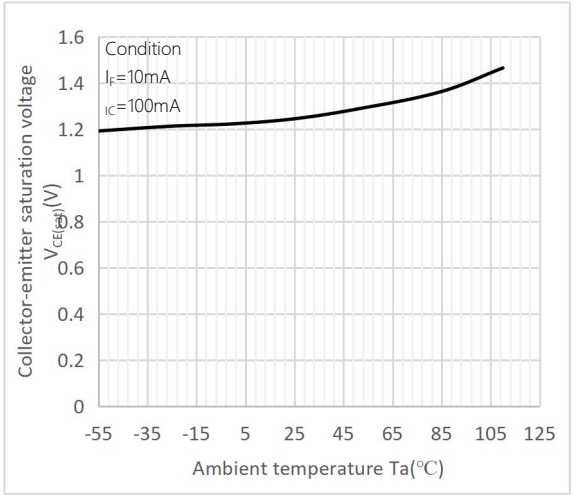



Fig.6 Collector Dark Current vs Ambient Temperature

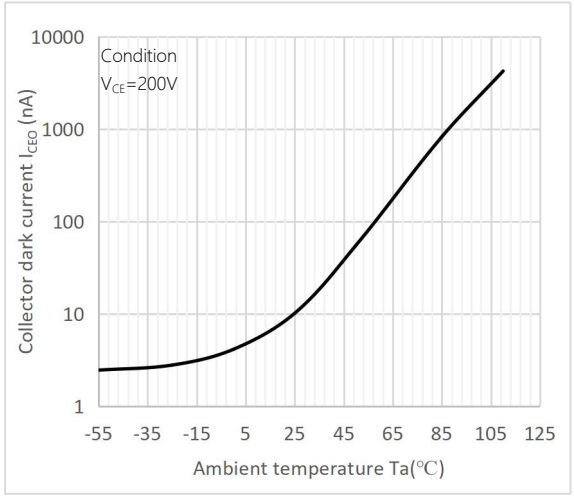


Fig.7 Response Time vs. Load Resistance

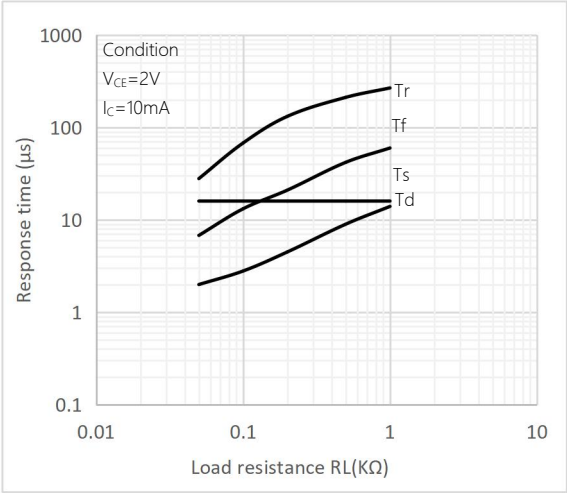



Fig.8 Frequency Response

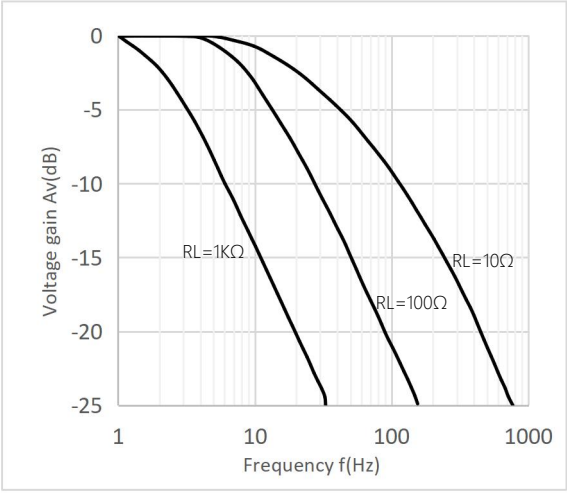



Fig.9 Collector-emitter Saturation Voltage vs Forward Current

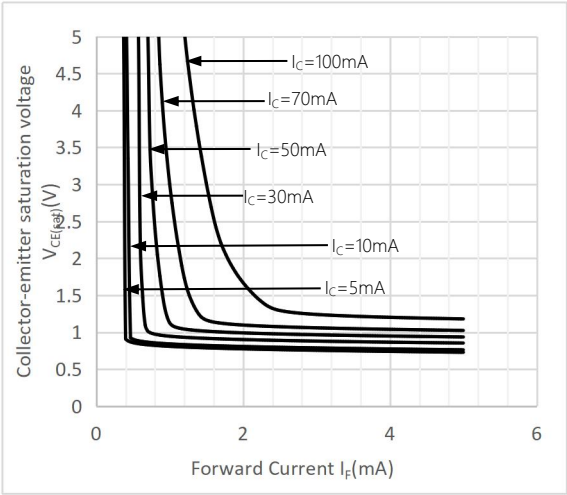
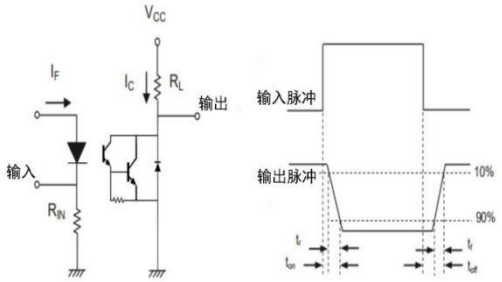
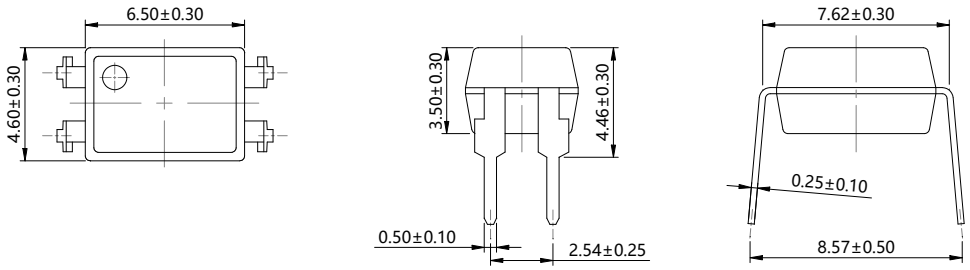



Fig.10 Switching Time Test Circuit & Waveforms

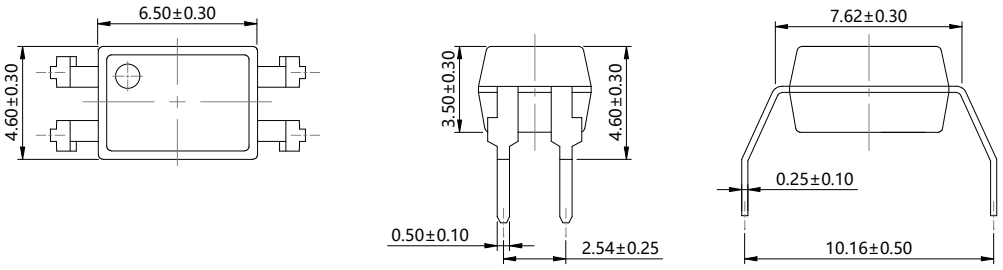


## 外形尺寸 Outline Dimensions

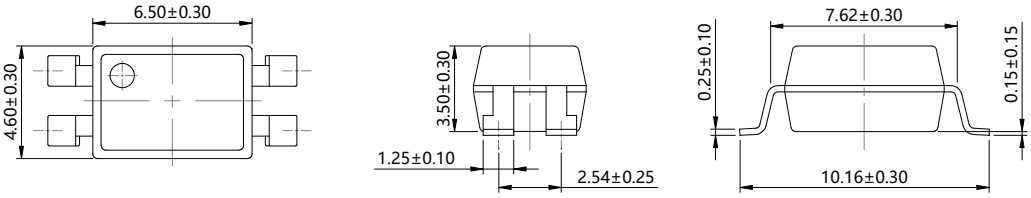
DIP4




DIP4-M

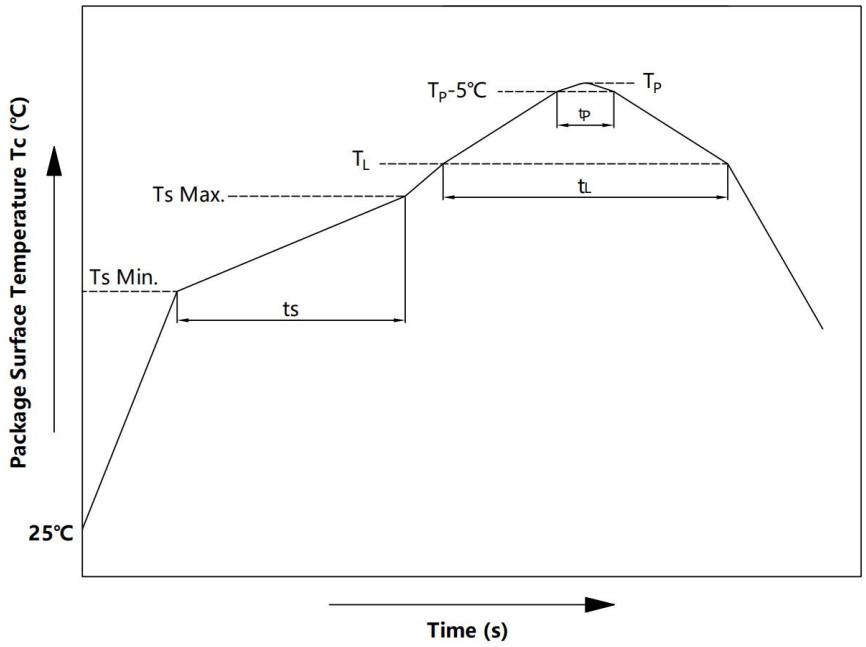



SMD




单位 Unit: mm

## 回流焊温度曲线图 Solder Reflow Profile



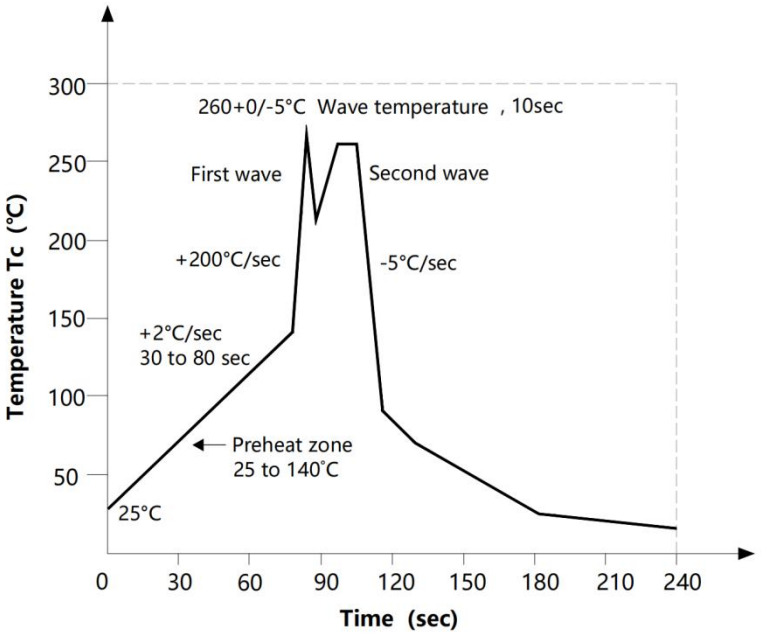

| 项目<br>Item | 符号<br>Symbol | 最小值<br>Min. | 最大值<br>Max. | 单位<br>Unit |
|---|---|---|---|---|
| 预热温度<br>Preheat Temperature | Ts | 150 | 200 | ℃ |
| 预热时间<br>Preheat Time | ts | 60 | 120 | s |
| 升温速率<br>Ramp-Up Rate ($T_L$ to $T_P$) | - | - | 3 | ℃/s |
| 液相线温度<br>Liquidus Temperature | $T_L$ | 217 | | ℃ |
| 时间高于 $T_L$<br>Time Above $T_L$ | $t_L$ | 60 | 150 | s |
| 峰值温度<br>Peak Temperature | $T_P$ | - | 260 | ℃ |
| Tc 在($T_P$-5)和 $T_P$ 之间的时间<br>Time During Which Tc Is Between ($T_P$-5) and $T_P$ | $t_p$ | - | 30 | s |
| 降温速率<br>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.

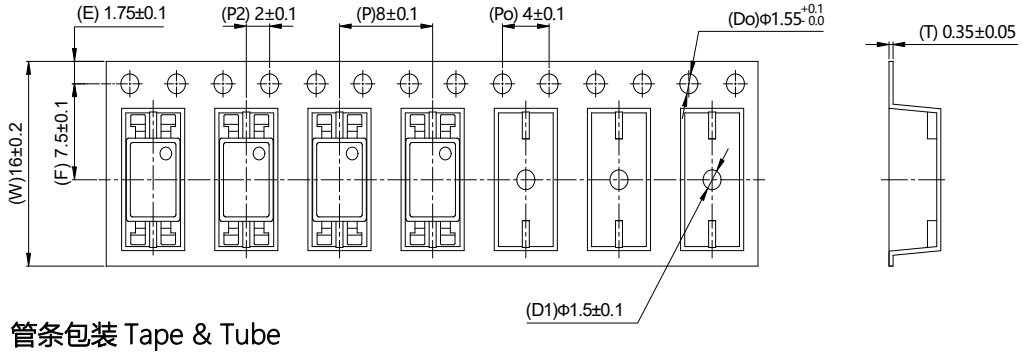
## 包装 Packing

■ 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 |
|---|---|---|---|---|---|---|---|---|
| SMD4 | 卷盘 (ϕ330mm 蓝盘) | 2000 只/盘 | 2 盘/盒 | 10 盒/箱 | 450*390*0.1mm | 340*60*34mm | 620*360*365mm | 首尾端空至少 200mm |
| DIP4 | 管装 (500*12*11mm) | 100 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 |
| DIP4-M | 管装 (500*13*11mm) | 100 只/管 | 45 管/盒 | 10 盒/箱 | 不适用 | 525*136*58mm | 535*295*310mm | |
| Package Type | Packing Form | Quantity per Reel | Quantity per Box | Quantity per Carton | Antistatic Bag Specification | Box Specification | Carton Specification | Note |
| SMD4 | Reel (ϕ330mm Blue) | 2000 pcs/reel | 2 reels/box | 10 boxes/ctn | 450*390*0.1mm | 340*60*34mm | 620*360*365mm | Guard band 200mm min. |
| DIP4 | Tube (500*12*11mm) | 100 pcs /tube | 50 tubes/box | 10 boxes/ctn | NA | 525*128*56mm | 535*275*300mm | Endplug (blue) and Endplug (white) keep the direction |
| DIP4-M | Tube (500*13*11mm) | 100 pcs /tube | 45 tubes/box | 10 boxes/ctn | NA | 525*136*58mm | 535*295*310mm | |

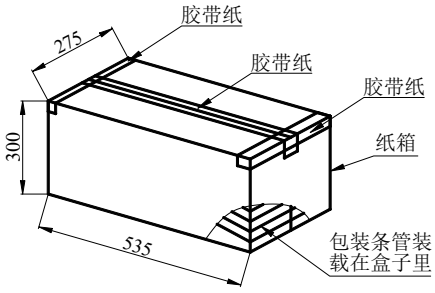
■ 编带包装 Tape & Reel

1) 每卷数量：2000 只。
   Qty/reel：2000 pcs.
2) 每箱数量：40000 只。
   Qty/ctn：40000 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：100 只。
   Qty/Tube：100 pcs.
2) 每箱数量 DIP4/DIP4-M：50000/45000 只。
   Qty/ctn DIP4/DIP4-M：50000/45000 pcs.
3) 内包装 DIP4/DIP4-M：每盒 50/45 管。
   Inner packing DIP4/DIP4-M：50/45 Tube/box.
4) 示意图 Schematic：




单位/Unit：mm

## 注意 Attention

- 群芯持续不断改进质量、可靠性、功能或设计，保留此文件更改的权利恕不另行通知。
  QUNXIN continuously improve quality, reliability, function and design. We reserve the right to change this document without prior notice.
- 请遵守产品规格书使用，群芯不对使用时不符合产品规格书条件而导致的质量问题负责。
  Please use in accordance with the product specification. QUNXIN is not responsible for the quality problems caused by non-compliance with the product specifications.
- 对于需要高可靠性或安全性的设备/装置需求，请联系我们的销售人员。
  For equipment/devices requiring high reliability or safety, please contact our sales representatives.
- 当需要用于任何"特定"应用时，请咨询我们的销售人员。
  When requiring a device for any "specific" application, please contact our sales in advice.
- 如对文件中表述的内容有疑问，欢迎联系我们。
  If you have any questions about the contents of the document, please contact us.