MF72 功率型 直热式负温度系数热敏电阻器
MF72 power direct heat type negative temperature coefficient thermistor

产品特点 Feature of Power Thermistor

1 应用范围

○转换电源，开关电源，UPS 电源

○镇流器及各类加热器

○各类显像管，显示器

○电子节能灯，其他照明灯具

Appliaction

○Switching power-supply,switch power,ups power

○Electronic energy saving lamps electronic ballast and allkinds of electric heater

○All kinds of RT,display

○Bulb and other lighting lamps

2 特点

○体积小，功率大，抑制浪涌电流能力强

○反应速度快

○材料常数（B 值）大，残余电阻小

○寿命长，可靠性高

○系列全，应用范围宽

Characteristic

○Small size,large power,strong capacity of suppression of inrush current

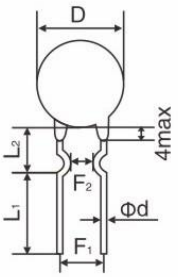
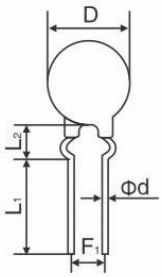
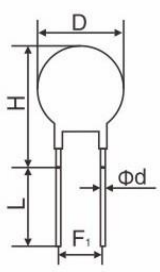
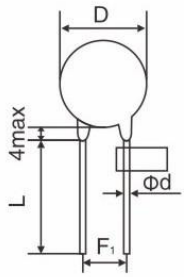
○Fast resporse

○Big material constant(B value),small residual resistance

○Long life and high reliability

○Complete series,wide applications

引线形状和产品尺寸 Lead Style and Product Size

内弯脚 (I Type)	外弯脚 (O Type)	侧弯脚 (Y Type)	直线脚 (S Type)	厚度（T）
				

说明：若非特别指出，常用外形为内弯型长引线。

Note: if the particular shape, commonly used for bending type, namely the inner-bended forming for long lead

型号	产品形状	最大直径 Dmax	最大厚度 Tmax	引线直径 Φd±0.05mm	间距 F±1mm	引线长度	
						L min	L2
NTC 20D-20	内弯脚	22.5mm	6mm	1mm	10/7.5	20mm	7or4
	外弯脚	22.5mm	6mm	1mm	10/7.5	20mm	7or4
	侧弯脚	22.5mm	6mm	1mm	10/7.5	20mm	/
	直线脚	22.5mm	6mm	1mm	10/7.5	20mm	/

材料

①、封装材料（Wrapper） ：酚醛树脂（Modified phenolic resin）

②、引线（Down - lead） ：CP 线（CP Wire）

③、颜色（Coating color） ： 黑色（Black）

印字方式		
NTC 20D-20	NTC	负温度系数热敏电阻器NTC thermistor
	20	额定零功率电阻值20
	D	圆片型 Disk-Type
	20	直径 22.5±1(mm)

技术参数technical parameters

型号 Part No	R25 （Ω）	最大稳态电流 Max.steady State current (A)	残余电阻* Residual Resistance (Ω)	耗散系数* Dissipation factor （mw/℃）	热时间常* Themal time Constant (s)	最大允许 使用容量值 240V/120V(μF)	B值 （K）	工作温度 (℃)
20D-20	20	5	0.212	约24	约113	820/3300	3200	-40~ +200

产品性能properties of products

电气性能ELECTRICAL CHARACTERISTICS		
指标项目Item	技术要求Specification	测试条件/方法Test Conditions & Methods
额定零功率电阻 Rated Zero-Power Resistance RN (Ω)	20±20%	环境温度 TA: 25℃±1℃ 测试电压: 1.5VDC 在恒温TA 条件下，放置1~2 小时后测得阻值RN。 Ambient temp. Range:25℃±1℃(TA). Testing voltage: 1.5VDC After placing for 1~2 hours under TA, the resistance value shall be measured
热耗散系数δ(mW/℃) Thermal Dissipation Constant	约24	在特定的环境温度下，热耗散系数(δ)为热敏电阻电功率消耗(ΔP)与本体温度变化量 (ΔT)的比值. The thermal dissipation constant(δ) could be calculated by the ratio of a change in power dissipation(ΔP) of the thermistor to a change in temperature(ΔT) of the thermistor at a specified ambient temperature
热时间常数τ(s) Thermal Time Constant	约113	热时间常数(τ)为在零功率条件下，热敏电阻的温度下降到其最初温度与最终温度之差为63.2% 时所需要的时间 The time(τ shall be measured within which the temperature change of NTC thermistor is reached at 63.2% of the ambient temperature change under zero power condition
材料常数 Material Constant B	3200±10%	R1，R2 分别为 T1，T2 温度下的零功率电阻 R1，R2 is zero-power resistance at T1，T2 T1 = 298.15 K(25℃) T2 = 323.15 K(50℃)
最大稳态电流(A) Max.Steady State Current	无可见损伤 visible mechanical damage. ΔRN / RN ≤20% (ΔR =｜RN-RN'｜)	环境温度:25℃±2℃Ambient temp. Range. 测试电流 5A Testing Current

机械性能MECHANICAL CHARACTERISTICS		
指标项目 Item	技术要求 Specification	测试条件/方法 Test Conditions & Methods
可焊性Solder-ability	浸润部分上锡均匀，上锡面积≥95% The terminals shall beuniformly tinned, and its area≥95%	将引出端沾助焊剂后，浸入到温度为 240-245℃、深度为 15mm 的锡槽中锡面距 NTC 本体下端 6mm 处，持续 2-3 秒。（参见 IEC68-2-20 /GB2423.28 试验 Ta） Dipping the NTC terminals toa depth of 15mm in a solderingbath of 240- 245℃andto the place of 6mm far from NTCbody for2-3s (See IEC68-2- 20/GB2423.28 Ta)
耐焊接热 Resistance To Soldering Heat	无可见损伤 No visible mechanical damage.ΔR/RN ≤20% (ΔR =｜RN-RN'｜)	根据IEC68-2-20（GB2423 .28）试验Tb 进行试验。采用焊槽法，将引出端沾助焊剂后，浸入到温度为265±5℃、深度为15mm 的锡槽中，锡面距NTC 本体下端6mm处，维持10±1 秒. 在25±2℃条件下恢复4—5h 后，复测额定零功率电阻RN'. Dipping the NTC terminals to a depth of 15mm in a soldering bath of 265±3℃ and to the place for 6mm below from NTC body for 10±1s.After recovering4-5h under 25±2℃. The rated zero power resistance value RN' shall be measured. (See IEC68-2-20 /GB2423.28 Tb)
引出端强度 Strength of lead terminal	无损坏 No break out ΔR/RN ≤20% (ΔR =｜RN-RN'｜)	根据IEC68-2-21（GB2423 .29）试验U 进行试验。 试验 Ua：拉力10N，持续10 S； 试验 Ub：弯曲90°，拉力5N，持续10 S； 扭转 180°，拉力5N，持续10 S。 在 25±2℃条件下恢复4～5 h 后，复测额定零功率电阻RN' Fasten the body and apply a force gradually to each lead until 10N and then keep for 10sec, Hold body and apply a force to each lead until 90°slowly at 5N in the direction of lead axis and then keep for 10sec, and do this in the opposite direction repeat for other terminal. After recovering 4~5h under 25±2℃, the rated zero power resistance value RN' shall be measured. (See IEC68-2-21/GB2423.29 Ua / Ub)

可靠性试验（周期性检测项目）Reliability Test		
指标项目 Item	技术要求 Specification	测试条件/方法 Test Conditions & Methods
温度循环测试 Temp. Cycling Testing	无可见损伤 No visible mechanical damage. ΔRN / RN ≤20% (ΔR =｜RN-RN'｜)	在 Ta=-40±3℃和Tb=200±3℃的环境温度中各存放30 分钟，循环5 次.每次高低温循环都有在25±2℃的环境中过渡5 分钟。样品进行温度循环测试后，取出放置室温（25±2℃） 4~5 小时后测量零功率电阻RN'. Ta:-40±3℃/ 30min→25±2℃/ 5min→ Tb:200±3℃/ 30min→25±2℃/ 5min Cycles: 5times After recovering 4~5 h under 25±2℃,the rated zero power resistance value RN' shall be measured.

电循环测试 Electrical Cycling Testing	无可见损伤 No visible mechanical damage. ΔRN / RN ≤20% (ΔR =｜RN-RN'｜)	环境温度:25℃±2℃. 循环次数: 1,000 次 通/断: 1 分钟 / 5 分钟 测试电流 5A 样品置于室温（25±2℃）4~5 小时后,测量其零功率电阻RN'. Ambient temp. Range:25℃±2℃. Cycles: 1,000times On / Off: 1m / 5m Test Current 5A After recovering 4~5h under 25±2℃, the rated zero power resistance value RN' shall be measured.
持久性测试 LoadLife (Endurance) Testing	无可见损伤 No visible mechanical damage. ΔRN / RN ≤20% (ΔR =｜RN-RN'｜)	环境温度:25℃±2℃.样品通过最大工作电流 5A , 1,000±24 小时后，取出置于室温（25±2℃）4~5 小时后,测量其零功率电阻RN'. Ambient temp. Range:25℃±2℃;5A/ 1,000±24h After recovering 4~5 h under 25±2℃, the ratedzero power resistance value RN' shall be measured.
耐湿性测试 Humidity Testing	无可见损伤 No visible mechanical damage. ΔRN / RN ≤20% (ΔR =｜RN-RN'｜)	在温度 40±2℃,相对湿度 93±3%的环境中放置 1000±24 小时后，取出置于室温（25±2℃）4~5 小时后, 测量其零功率电阻RN'. Ambient temp. range : 40℃±2℃ R.H.:93±3% , Energized time:1000±24 h After recovering 4~5 h under 25±2℃, the rated zero power resistance value RN' shall be measured

热敏电阻选用原则Principle of thermal resistor is chosen

1. 热敏电阻的最大工作电流＞回路的工作电流

Thermistor maximum operating current> loop operating current

2 热电阻的标称电阻值R≥1.414*E/Im

Nominal resistance values of thermal resistance R≥1.414 * E / Im

E 为线路电压 E is the line voltage Im为浪涌电流 Im a surge current 一般来讲对于开关电源 转换电源 不间断电源 逆变电源等Im=100 倍工作电流对于灯丝加热器等的电路Im=30 倍工作电流

In general, the switching power supply, switching power supplies, uninterruptible power supplies, power inverter and other times operating current Im = 100For the filament heater circuit like Im = 30 times the operating current

3 B值越大，残余电阻越小，工作时温升越小。

B The larger the value, the smaller the residual resistance, the smaller the temperature rise during operation.

4. 热时间常数和耗散系数两者为互为依赖的关系，并不是说某一个数值越大越好或越小越好，而是两者的乘积越大说明热敏电阻的热容量就越大，那么抗浪涌电流的能力就越强。

Thermal time constant and dissipation factor as both mutually dependent relationship, not to say that one or the greater the value, the better the smaller the better, but the product of the two greater the heat capacity of the thermistor greater, then resistance to surge

current, the stronger

5. 热敏电阻用于电源电路时主要是用来抑制开机时的大浪涌电流，大的浪涌电流是电容放电产生，所以电路中所要安装的滤波储能电容的选配也是很关键的一个条件，为确保热敏电阻器能够安全的起到保护电路的作用，所以要求电源设计厂家也应该充分考虑这一因素。

When the power supply circuit for the thermistor is mainly used to suppress large inrush current at power - on, a large inrush current is the capacitor discharge, the filter to be installed in the tank circuit capacitance matching is a very critical condition to ensure that the thermistor circuit can play a role in security protection, so the power supply design requirements for manufacturers should also take full account of this factor.

6. 通过电路中的最大工作电压和最大启动电流等参数可以利用公式R=U/I 计算出电阻值范围。

Through the circuit maximum operating voltage and maximum starting current and other parameters can use the formula R = U / I calculated the resistance value range.

热敏电阻技术术语

NTC 热敏电阻器及其温度传感器的主要参数：

零功率电阻值 R_T

在规定温度下，采用引起电阻变化相对于总的测量误差来说可以忽略不计的测量功率测的的电阻值

额定零功率电阻值 R_{25}

也称标称电阻值，通常是指 25℃时测得的零功率电阻值

B 值

B 值是负温度系数热敏电阻器的热敏指数，他被定义为两个温度下零功率电阻值的自然对数之差与这两个温度导数之差的比值

$$B=\ln\frac{R_{T1}}{R_{T2}} \Big/ \left(\frac{1}{T_1}-\frac{1}{T_2}\right)=\frac{T_1T_2}{T_2-T_1}\ln\frac{R_{T1}}{R_{T2}}$$

式中：R_{T1}-温度为 T1 时的零功率电阻值

R_{T2}-温度为 T2 时的零功率电阻值

除非特别指出，B 值是由 25℃（298.15K）和 50℃(323.15K)的零功率电阻值计算而得到的，B 值在工作温度范围内并不是一个严格的常数。

零功率电阻温度系数α_T

指在规定温度下，热敏电阻器的零功率电阻值随着温度的变化率与它的零功率电阻值之比。

$$\alpha_T=\frac{1}{R}\frac{dR_T}{dT}=-\frac{B}{T^2}$$

式中：α_T-温度为 T 时的零功率电阻温度系数

R_T-温度为 T 时的零功率电阻值

T-温度（以 K 表示）

B-B 值

Main techno-Parameter of NTC Thermistor:

Zero Power Resistance R_T

At rated temperature ,it is the resistance measured by the measuring power which causes the resistance change that can be ignored relative to the whole measuring error.

Rated Zero Power Resistance R_{25}

Also Known as Nominal Resistance,is the zero power resistance measured at 25℃

B Value

B Value is the thermel exponent of negative temperature coefficient thermistor, which is defined as the ratio of the difference between the napierian logarithm of zero power resistance at two temperatures to the difference between the temperatures' reciprocal.

In the equation: RT1-The zero power resistance at T1

RT2-The zero power resistance at T2

Unless the particular indication, B value is figured out from the zero power resistance at 25℃（298.15K） and 50℃(323.15K) and B value is not a rigorous constant in the range of operating temperature.

Temperature Coefficient of Zero power Resistance α_T

At rated temperature, it is the ratio of the zero power resistance change rate with temperature to the zero power resistance itself.Namely：

α_T-the temperature coefficient of zero power resistance at T

R_T-the zero power resistance at T

T-temperature

B-B value

耗散系数 δ

在规定的环境温度下，热敏电阻器耗散功率变化与其相应温度变化之比，即

$$\delta = \frac{\Delta P}{\Delta T}$$

在工作温度范围内，δ随着环境温度的变化而变化。

Dissipation coefficient δ

At rated ambient temperature, it is the radio of consumption power change rate of thermistor to the change of the corresponding temperature,namely:

In the range of operating temperature, δ has a little change with the ambient.

热时间常数 τ

在零功率条件下，当温度发生突变时，热敏电阻体温度变化了始末两个温度差的 63.2%所需的时间。

τ 与热敏电阻器的热容量 C 成正比，与其耗散系数 δ 成反比，即：

$$\tau = \frac{C}{\delta}$$

Thermal Time Constant τ

At zero power,it is measured as time in seconds which needed for thermistor temperature change of 63.2% difference between initial and final thermistor temperature when the temperature breaks.

τ is in direct ratio to thermal capacity C of thermistor and in inverse ratio to the dissipation coefficient δ ,namely:

电阻-温度特性

热敏电阻器的零功率电阻值与其电阻体温度之间的依赖关系。

Resistance-Temperature Characteristic

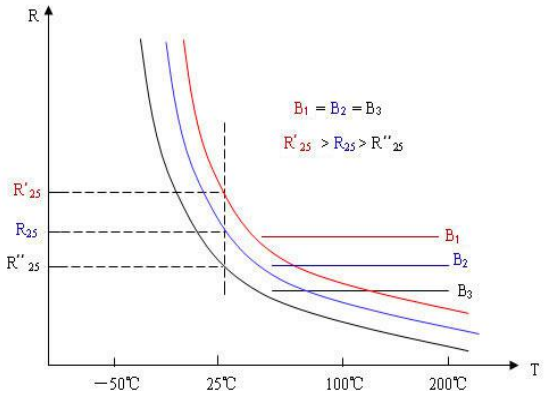
The reliant relationship between the zero power resistance of thermistor and its temperature.

R 值与 B 值关系

热敏电阻器的零功率电阻值与其电阻体温度之间的依赖关系。

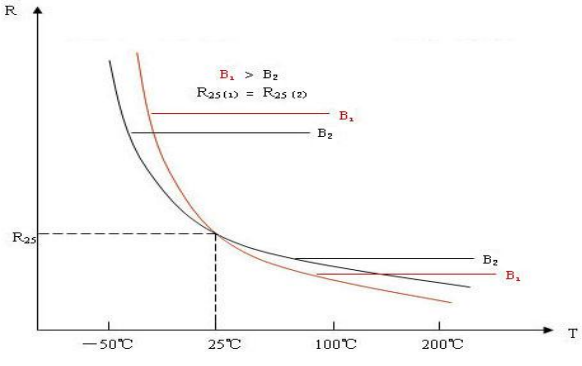
R-T curve NTC thermisor

The reliant relationship between the zero power resistance of thermistor and its temperature.



B 值相同，阻值不同的 R-T 特性曲线示意图

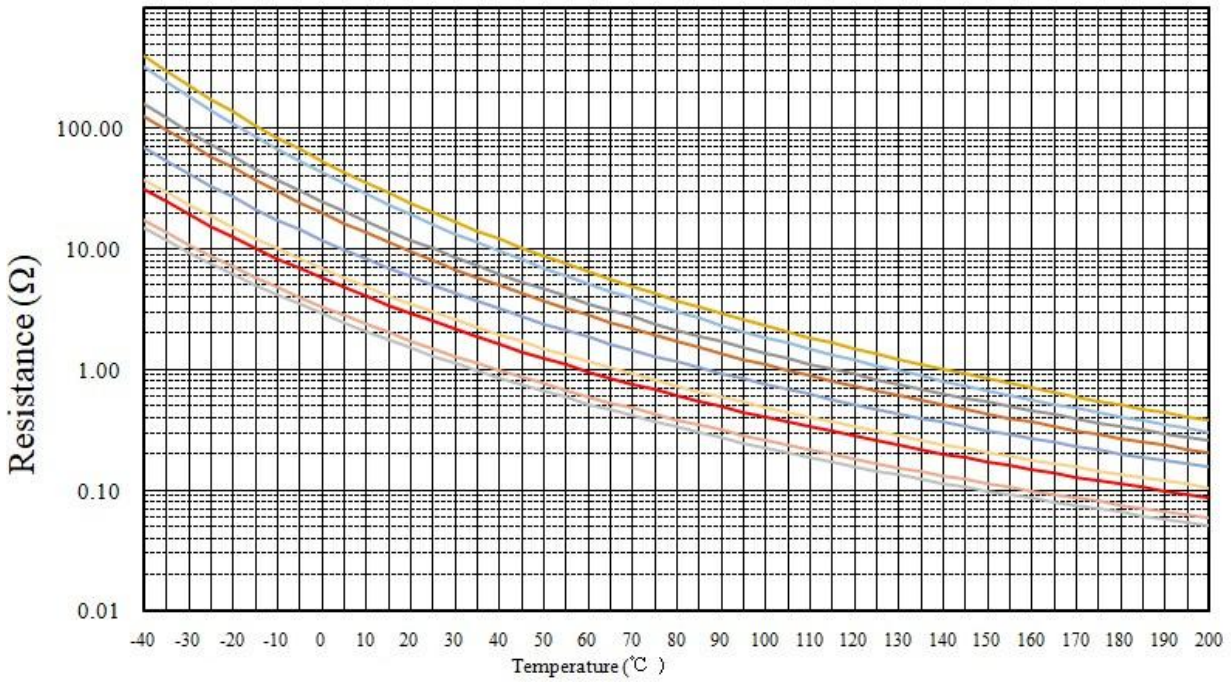
R-T curve based on same B value, different resistance



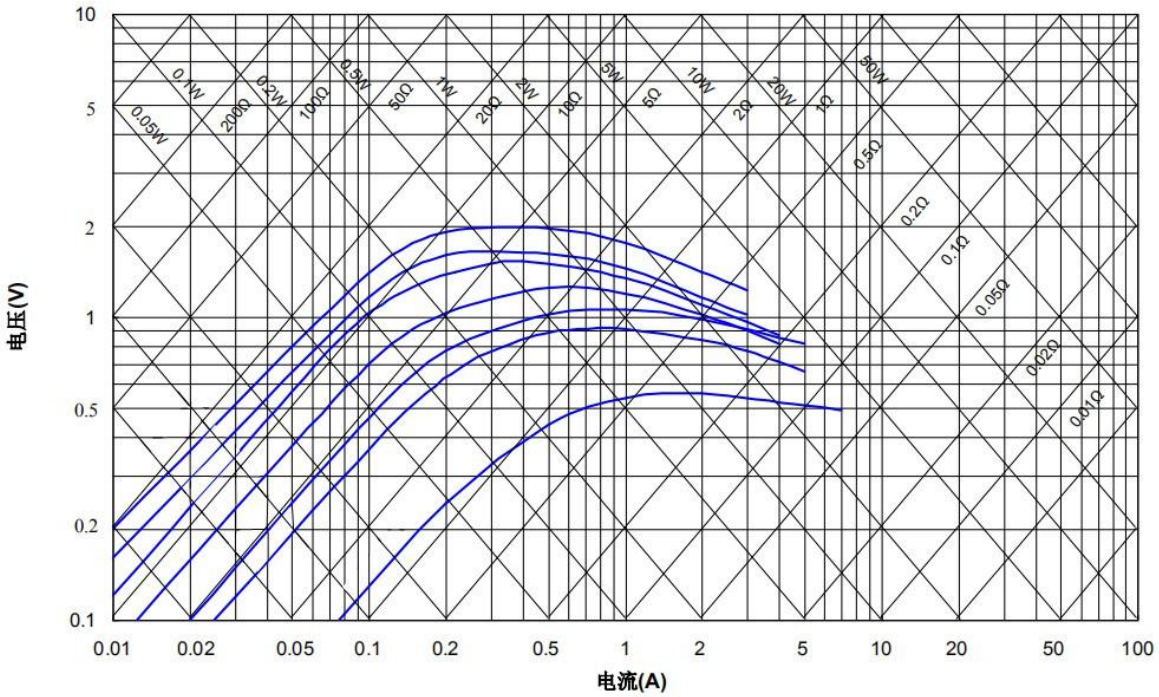
相同阻值，不同 B 值的 R-T 特性曲线示意图

R-T curve based on different B value, same resistan

产品阻温特性 Resistance-Temperature Characteristic



静态伏安特性 Staracteristic



存储条件 Storage condition

温度 Temperature	-10℃～+40℃
湿度 Humidity	≤70%RH
期限 Term	≤1 年 (先进先出 First-in/ First-out)
地点 Place	1.不要暴露在下列环境条件下，否则将导致性能衰退或参数漂移 Do not exposing the components to the following conditions, otherwise, it may result in deterioration of characteristics 2. 腐蚀性或易氧化气体 Corrosive gas or deoxidizing gas 3. 易燃易爆气体 Flammable and explosive gases 4. 油、水和化学溶液 Oil, water and chemical liquid 5. 太阳光下 Under the sunlight

储存环境条件

请不要在下列条件下使用本元件，否则将可能导致性能衰退或产品损毁，甚至引起火灾。

Do not apply the components under the following conditions, otherwise, it may result in deterioration of characteristics,destruction of components orin the worst case,to catching fire

超过最大的工作电流Exceeding Imax

超过许可工作温度范围Exceeding rated temperature range

散热不良，由于散热不良，本元件可能因部分过热而导致破坏

Inferior thermal dissipation，Due to badly inferior thermal dissipation, some part of the components body will become overheated and then be damaged

包装方式 Packing methods

散装包装数量 Bulk/Packing Style

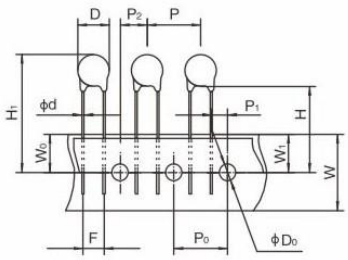
常规产品包装 Normal product packaging

规格Dimension	一袋Bag	内盒Insidethe box	外箱carton
NTC□D-5	1000 pcs	3000 pcs	18000 pcs
NTC□D-7	1000 pcs	3000 pcs	18000 pcs
NTC□D-9	500 pcs	2000 pcs	12000 pcs
NTC□D-11	500 pcs	1500 pcs	9000 pcs

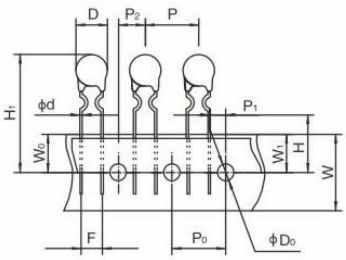
切脚产品包装 Cut the feet product packaging

规格Dimension	一袋Bag	内盒Insidethe box	外箱carton
NTC□D-5	1000 pcs	8000 pcs	48000 pcs
NTC□D-7	1000 pcs	5000 pcs	30000 pcs
NTC□D-9	500 pcs	4000 pcs	24000 pcs
NTC□D-11	500 pcs	3000 pcs	18000 pcs
NTC□D-13	250 pcs	2000 pcs	12000 pcs
NTC□D-15	250 pcs	1000 pcs	6000 pcs
NTC□D-20	100 pcs	400 pcs	2400 pcs

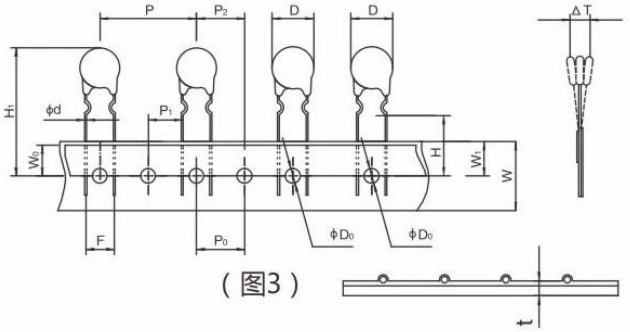
编带包装式样 Packing style



（图1）



（图2）



（图3）

编带尺寸 Tape size

名称 Description	符号 Symbol	外观 Exterior	产品直径 Dimension					
			5	7	9-11	13	15	20
编带间距 Taping pitch	P±1	直脚/弯脚	12.7	12.7	12.7/25.4/15	15/25.4	15/30	25.4
输送孔间距 Feed hole pitch	P0±1	直脚/弯脚	12.7	12.7	12.7/15	12.7/15	12.7/15	12.7
对输送孔的偏 Feed hole off alignment	P1±0.7	直脚/弯脚	3.75	3.75	3.75/8.95	3.75/8.95	3.75/8.95	7.7
	P2±1.3	直脚/弯脚	6.35	6.35	6.35/7.5/12.7	7.5/12.7	7.5/12.7	12.7
底部高度 Bottom height	H±1.0	直脚	19	19	19	19	19	19
		弯脚	18	18	18	18	18	18
顶部高度 Top henight	H1max	直脚/弯脚	29.0	32.0	36.0	40	40	/
载带宽度 Carrier tape width	W±1.0	直脚/弯脚	18	18	18	18	18	18
胶带宽度 Adhesive tape width	W0±0.5	直脚/弯脚	10.0	10.0	10.0	10.0	10.0	12.0
对输送孔的高度偏移 Feed hole height offalignment	W1±0.5	直脚/弯脚	9.0	9.0	9.0	9.0	9.0	9.0
输送孔直径 Feed hole diameter	D0±0.3	直脚/弯脚	4.0	4.0	4.0	4.0	4.0	4.0
本体直径 Body diameter	Dmax	直脚/弯脚	7.0	9.0	11.0/13.0	15.5	17.5	22.5
引线直径 Wire lead diameter	d±0.05	直脚/弯脚	0.55	0.55	0.55/0.75	0.75	0.75/0.95	1.0
产品在胶带上偏差 Deviation across tape	△T max	直脚/弯脚	2.0	2.0	2.0	2.0	2.0	2.0
编带总厚度 Overall tape thichness	t±0.2	直脚/弯脚	0.7	0.7	0.7	0.7	0.7	0.7
引线间距 Lead spacing	F±1.0	直脚/弯脚	5.0	5.0	7.5/5.0	7.5	7.5	10.0

NTC 热敏电阻注意事项NTC thermistor to use matters needing attention

请遵循以下事项，否则可能会造成NTC 热敏电阻损坏，使用设备损伤或引起误动作等后果
Please follow the following, or may result in damage to the NTC thermistor, the use of equipment damage or cause false action, etc.
①、请勿在使用温度范围以外使用，请勿施加超出使用温度范围上下限的急剧温度变化。
Please follow the following, or may result in damage to the NTC thermistor, the use of equipment damage or cause false action, etc.
②、请在额定功率条件下使用NTC 热敏电阻。各规格最大额定功率为Φ7—1.2W Φ9—1.9W Φ11—2.3W Φ13—3W Φ15—3.5W Φ20—4W Please use the NTC thermistor under the rated power. The maximum rated power of each specification is Phi 7 Phi 9 - 1.2W - 1.9W 11 - 2.3W 13 - Phi Phi Phi Phi 20 3W 15 - 3.5W - 4W
③、在高湿高温环境下使用护套型NTC 热敏电阻时应采取仅使护套封闭部分暴露于环境（水中 湿气）中，而护套开口部分不会直接接触到水及蒸汽的设计
In the high humidity and high temperature environment, the sheath type NTC thermal resistance should be used only to expose the sealing part of the sheath to the environment (moisture in water), and the opening part of the sheath will not be directly exposed to the design of water and steam.
④、配线时应确保导线端部（含连接器）不会深入水.蒸汽.电解质液等否则会造成接触不良。
Wiring should ensure that the end of the wire (including connectors) will not be deep water. Steam. Electrolyte solution, etc., will result in poor contact.
⑤、请勿在腐蚀性气体的环境（Cl2 .NH3 .SOx.NOx）以及会接触到电解质液.盐水.酸.碱.有机溶剂的场所中使用。
Please do not be exposed to the corrosive gas environment (.NH3.SOx.NOx Cl2) and will be exposed to the electrolyte solution.
⑥、请勿过度拉伸及弯曲导线，请勿施加过度的振动.冲击及压力
Do not over stretch and bend the wire, please do not exert excessive vibration.
⑦、金属腐蚀可能会造成设备功能故障，故在选择材质时应确保金属护套型及螺钉紧固型NTC热敏电阻与安装的金属件之间不会产生接触的电位差。
Metal corrosion may cause equipment fault, so make sure not between metal metal support and screw fastening type NTC thermistor and installation of the contact potential difference in the choice of materials.
⑧、功率型NTC 周围应避免安装发热和易燃元件，建议选用弯脚上部引线较高的产品，使NTC热敏电阻在线路板上高出其它元件，以免发热影响其它元件正常工作。
Around the power type NTC should be avoided to install heat and flammable components, recommended products with higher bending the upper lead, the NTC thermistor on the circuit board is higher than other elements, so as not to affect the normal work of other heating element.
⑨、NTC 热敏电阻是按不同的功能用途分别进行设计的,如有疑问可与我司联络。
NTC thermistor is designed according to different functions, such as the question can contact with me.