

## 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

#### 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

#### 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

### Feature of Power Thermistor

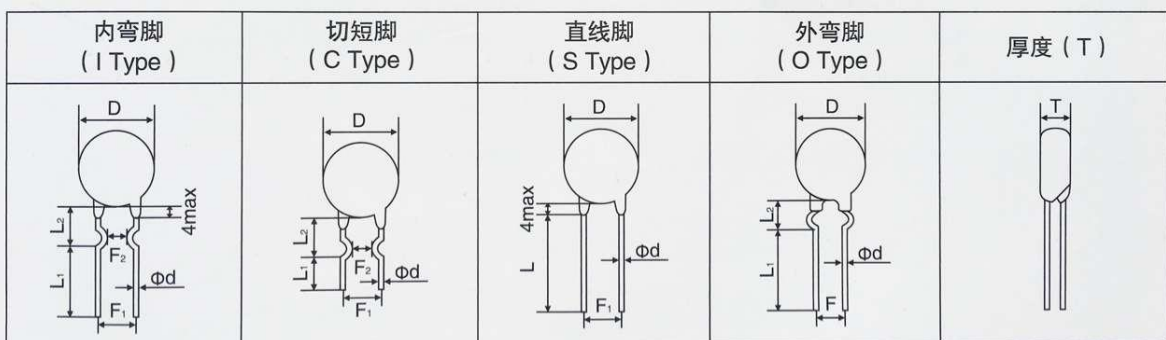
#### Application

- 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

#### Characteristic

- Small size,large power,strong capacity of suppression of inrush current
- Fast response
- 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



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/尺寸 (mm) /代号	Dmax	Tmax	Φd±0.05	F <sub>1</sub> ±1	F <sub>2</sub> ±1.5	直引线 L min	弯引线&直引线	
							L <sub>1</sub> ±1	L <sub>2</sub> ±2
NTC□D-5	7	5	0.55	5	3	15	3.5-17	7/4
NTC□D-7	9	5	0.55	5	3	15	3.5-17	7/4
NTC□D-9	11	5.5	0.75/0.55	7.5/5	5/3	15	3.5-17	7/4
NTC□D-11	13	5.5	0.75/0.55	7.5/5	5/3	15	3.5-17	7/4
NTC□D-13	15.5	6	0.75	7.5	5	15	3.5-17	7/4
NTC□D-15	17.5	6	0.75	10/7.5	5	15	17/5	7/4
NTC□D-20	22.5	7	0.95	10	/	15	/	/

备注 :□为额定零功率电阻值□Rated zero-power resistance



电气特性 Specification

型号 Part No	R25	最大稳态电流 MAX.steady State current	残余电阻 Residual Resistance	耗散系数 Dissipation factor	热时间常数 Thermal time constant	工作温度 Operating temperature
	Ω	A	Ω	MW/°C	S	°C
5D-5	5	1	0.35	6	20	-40~+150
10D-5	10	0.7	0.77	6	20	
60D-5	60	0.5	1.88	6	18	
200D-5	200	0.1	18.70	6	18	
5D-7	5	2	0.28	10	30	
8D-7	8	1	0.54	9	28	
10D-7	10	1	0.62	9	27	
12D-7	12	1	0.82	9	27	
16D-7	16	0.7	1.00	9	27	
22D-7	22	0.6	1.11	9	27	
33D-7	33	0.5	1.49	10	28	
200D-7	200	0.2	11.65	11	28	
3D-9	3	4	0.12	11	35	-40~+175
4D-9	4	3	0.19	11	35	
5D-9	5	3	0.21	11	34	
6D-9	6	2	0.32	11	34	
8D-9	8	2	0.40	11	32	
10D-9	10	2	0.46	11	32	
12D-9	12	1	0.66	11	32	
15D-9	15	1	0.80	11	31	
20D-9	20	1	0.88	11	30	
22D-9	22	1	0.95	11	30	
33D-9	33	1	1.12	11	30	
50D-9	50	1	1.25	11	30	
80D-9	80	0.8	2.01	11	30	
120D-9	120	0.8	3.02	11	30	
200D-9	200	0.5	5.01	11	30	
2.5D-11	2.5	5	0.10	13	43	
3D-11	3	5	0.100	13	43	
4D-11	4	4	0.15	13	44	
5D-11	5	4	0.16	13	45	
6D-11	6	3	0.24	13	45	
8D-11	8	3	0.25	14	47	
10D-11	10	3	0.28	14	47	
12D-11	12	2	0.46	14	48	
16D-11	16	2	0.47	14	50	
20D-11	20	2	0.51	15	52	
22D-11	22	2	0.56	15	52	



30D-11	30	1.5	0.67	15	52	
50D-11	50	1.5	1.02	15	52	
60D-11	60	1.5	1.22	15	52	
80D-11	80	1.2	1.66	15	52	
1.3D-13	1.3	7	0.06	13	60	-40~200
2.5D-13	2.5	6	0.088	13	60	
3D-13	3	6	0.092	14	60	
4D-13	4	5	0.12	15	67	
5D-13	5	5	0.125	15	68	
6D-13	6	4	0.17	15	65	
7D-13	7	4	0.188	15	65	
8D-13	8	4	0.194	15	65	
10D-13	10	4	0.206	15	65	
12D-13	12	3	0.316	16	65	
15D-13	15	3	0.335	16	65	
20D-13	20	3	0.372	16	65	
30D-13	30	2.5	0.517	16	65	
47D-13	47	2	0.810	17	65	
2.5D-15	2.5	8	0.071	18	76	
3D-15	3	7	0.075	18	76	
5D-15	5	6	0.112	20	76	
6D-15	6	5	0.155	20	80	
7D-15	7	5	0.173	20	80	
8D-15	8	5	0.178	20	80	
10D-15	10	5	0.180	20	75	
12D-15	12	4	0.250	20	75	
15D-15	15	4	0.268	21	85	
20D-15	20	4	0.288	17	86	
30D-15	30	3.5	0.438	18	75	
47D-15	47	3	0.680	21	86	
50D-15	50	3	0.720	21	86	
1.3D-20	1.3	9	0.037	24	113	
3D-20	3	8	0.055	24	113	
5D-20	5	7	0.087	23	112	
8D-20	8	6	0.142	25	115	
10D-20	10	6	0.162	24	113	
12D-20	12	5	0.195	24	114	
16D-20	16	5	0.212	25	113	

## 材料Materials

- 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)

## 存储条件Storage condition

存贮环境条件

温度Temperature	-10℃~+40℃
湿度Humidity	≤70%RH
期限Term	≤6 months (先进先出 First-in/ First-out)
地点Place	<p>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</p> <p>Do not exposing the components to the following conditions, otherwise, it may result in deterioration of characteristics</p> <p>2. 腐蚀性或易氧化气体Corrosive gas or deoxidizing gas</p> <p>3. 易燃易爆气体Flammable and explosive gases</p> <p>4. 油、水和化学溶液Oil, water and chemical liquid</p> <p>5. 太阳光下Under the sunlight</p>

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 or in the worst case, to catching fire

超过最大的工作电流Exceeding I<sub>max</sub>

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

## 产品性能properties of products

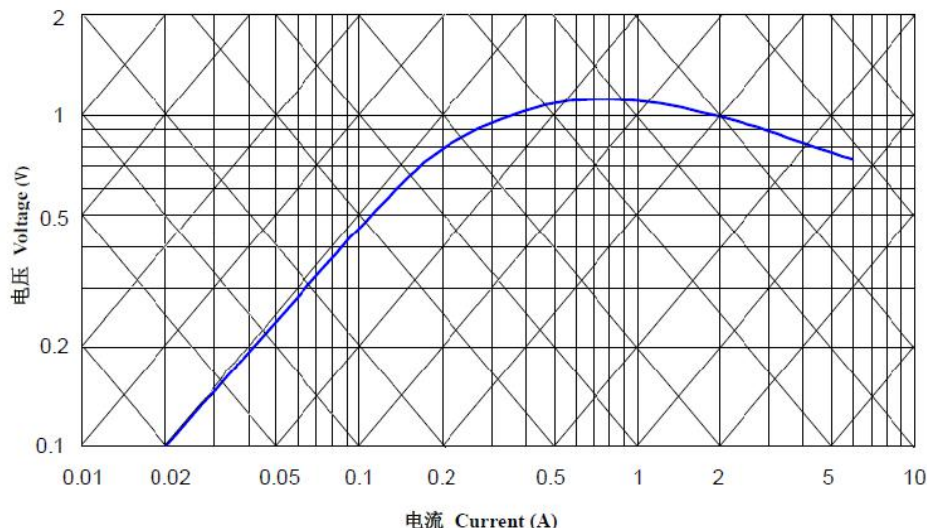
机械性能MECHANICAL CHARACTERISTICS		
指标项目 Item	技术要求 Specification	测试条件/方法 Test Conditions & Methods
可焊性Solder-ability	<p>浸润部分上锡均匀, 上锡面积≥95%</p> <p>The terminals shall be uniformly tinned, and its area ≥95%</p>	<p>将引出端沾助焊剂后, 浸入到温度为240-245℃、深度为15mm 的锡槽中锡面距NTC 本体下端6mm 处, 持续2-3秒。(参见IEC68-2-20 /GB2423.28 试验Ta)</p> <p>Dipping the NTC terminals to a depth of 15mm in a soldering bath of 240-245℃ and to the place of 6mm far from NTC body for 2-3s (See IEC68-2-20 /GB2423.28 Ta)</p>
耐焊接热 Resistance To Soldering Heat	<p>无可见损伤</p> <p>No visible mechanical damage. <math>\Delta R/RN \leq 20\%</math> (<math>\Delta R =  RN - RN' </math>)</p>	<p>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'.</p> <p>Dipping the NTC terminals to a depth of 15mm in a soldering bath of 265±5℃ and to the place for 6mm below from NTC body for 10±1s. After recovering 4-5h under 25±2℃. The rated zero</p>



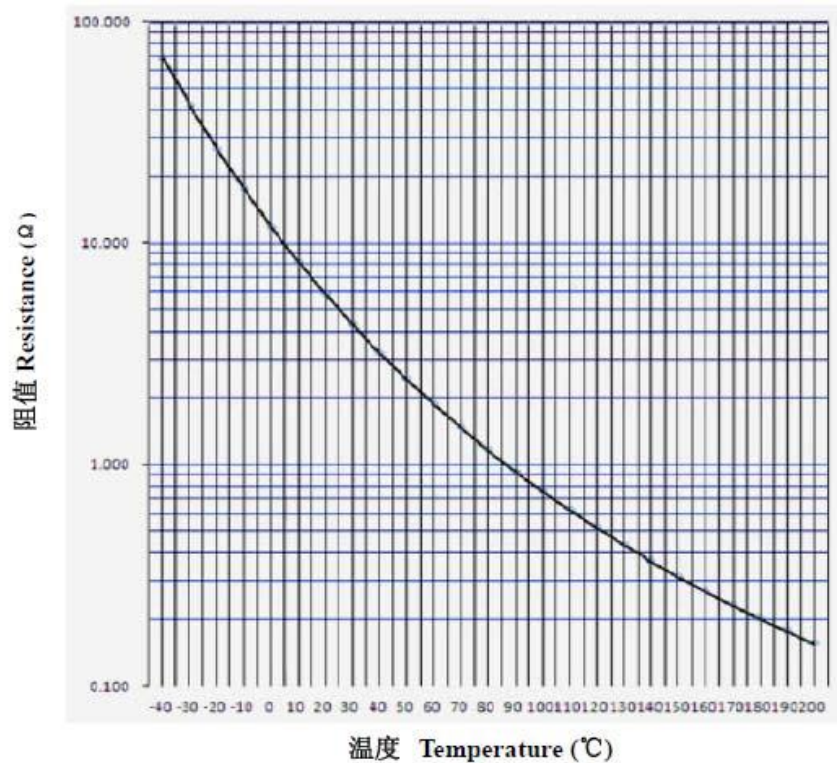
		power resistance value $R_N'$ shall be measured. (See IEC68-2-20 /GB2423.28 Tb)
引出端强度 Strength of lead terminal	无损坏 No break out $\Delta R/R_N \leq 20\%$ ( $\Delta R =  R_N - R_N' $ )	根据IEC68-2-21 (GB2423.29) 试验U 进行试验。 试验 Ua: 拉力10N, 持续10 S; 试验 Ub: 弯曲90°, 拉力5N, 持续10 S; 扭转 180°, 拉力5N, 持续10 S。 在 25±2°C条件下恢复4~5 h 后, 复测额定零功率电阻 $R_N'$ 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°C, the rated zero power resistance value $R_N'$ shall be measured. (See IEC68-2-21/GB2423.29 Ua / Ub)
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 $R_N$ ( $\Omega$ )	20±20%	环境温度 TA: 25°C±1°C 测试电压: 1.5VDC 在恒温TA 条件下, 放置1~2 小时后测得阻值 $R_N$ 。 Ambient temp. Range:25°C±1°C (TA). Testing voltage: 1.5VDC After placing for 1~2 hours under TA, the resistance value shall be measured
热耗散系数 $\delta$ (mW/°C) Thermal Dissipation Constant	$\geq 6$	在特定的环境温度下, 热耗散系数( $\delta$ )为热敏电阻电功率消耗( $\Delta P$ )与本体温度变化量 ( $\Delta T$ )的比值。 The thermal dissipation constant( $\delta$ ) could be calculated by the ratio of a change in power dissipation( $\Delta P$ ) of the thermistor to a change in temperature( $\Delta T$ ) of the thermistor at a specified ambient temperature
热时间常数 $\tau$ (s) Thermal Time Constant	$\leq 20$	热时间常数( $\tau$ )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( $\tau$ 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	2800±10% $B = T_1 T_2 / (T_2 - T_1) \times \ln(R_1 / R_2)$	$R_1, R_2$ 分别为 $T_1, T_2$ 温度下的零功率电阻 $R_1, R_2$ is zero-power resistance at $T_1, T_2$ $T_1 = 298.15 \text{ K}(25^\circ\text{C})$ $T_2 = 323.15 \text{ K}(50^\circ\text{C})$
最大稳态电流(A) Max. Steady State Current	无可见损伤 visible mechanical damage. $\Delta R_N / R_N \leq 20\%$ ( $\Delta R =  R_N - R_N' $ )	环境温度:25°C±2°C Ambient temp. Range. 测试电流0.5A Testing Current
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	<p>无可见损伤 No visible mechanical damage.</p> $\Delta R_N / R_N \leq 20\%$ $(\Delta R =  R_N - R_N' )$	<p>在 <math>T_a = -40 \pm 3^\circ\text{C}</math> 和 <math>T_b = 200 \pm 3^\circ\text{C}</math> 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 <math>25 \pm 2^\circ\text{C}</math> 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 (<math>25 \pm 2^\circ\text{C}</math>) 4~5 小时后测量零功率电阻 <math>R_N'</math>。</p> <p><math>T_a: -40 \pm 3^\circ\text{C} / 30\text{min} \rightarrow 25 \pm 2^\circ\text{C} / 5\text{min} \rightarrow T_b: 200 \pm 3^\circ\text{C} / 30\text{min} \rightarrow 25 \pm 2^\circ\text{C} / 5\text{min}</math> Cycles: 5times After recovering 4~5 h under <math>25 \pm 2^\circ\text{C}</math>, the rated zero power resistance value <math>R_N'</math> shall be measured.</p>
电循环测试 Electrical Cycling Testing	<p>无可见损伤 No visible mechanical damage.</p> $\Delta R_N / R_N \leq 20\%$ $(\Delta R =  R_N - R_N' )$	<p>环境温度: <math>25^\circ\text{C} \pm 2^\circ\text{C}</math>。 循环次数: 1,000 次 通/断: 1 分钟 / 5 分钟 测试电流: 1.0A 样品置于室温 (<math>25 \pm 2^\circ\text{C}</math>) 4~5 小时后，测量其零功率电阻 <math>R_N'</math>。 Ambient temp. Range: <math>25^\circ\text{C} \pm 2^\circ\text{C}</math>. Cycles: 1,000times On / Off: 1m / 5m Test Current 1.0A After recovering 4~5h under <math>25 \pm 2^\circ\text{C}</math>, the rated zero power resistance value <math>R_N'</math> shall be measured.</p>
持久性测试 LoadLife (Endurance) Testing	<p>无可见损伤 No visible mechanical damage.</p> $\Delta R_N / R_N \leq 20\%$ $(\Delta R =  R_N - R_N' )$	<p>环境温度: <math>25^\circ\text{C} \pm 2^\circ\text{C}</math>。样品通过最大工作电流1.0A , 1,000±24 小时后，取出置于室温 (<math>25 \pm 2^\circ\text{C}</math>) 4~5 小时后，测量其零功率电阻 <math>R_N'</math>。 Ambient temp. Range: <math>25^\circ\text{C} \pm 2^\circ\text{C}</math>; 6.0A / 1,000±24h After recovering 4~5 h under <math>25 \pm 2^\circ\text{C}</math>, the rated zero power resistance value <math>R_N'</math> shall be measured.</p>
耐湿性测试 Humidity Testing	<p>无可见损伤 No visible mechanical damage.</p> $\Delta R_N / R_N \leq 20\%$ $(\Delta R =  R_N - R_N' )$	<p>在温度 <math>40 \pm 2^\circ\text{C}</math>，相对湿度 <math>93 \pm 3\%</math> 的环境中放置 1000±24 小时后，取出置于室温 (<math>25 \pm 2^\circ\text{C}</math>) 4~5 小时后，测量其零功率电阻 <math>R_N'</math>。 Ambient temp. range : <math>40^\circ\text{C} \pm 2^\circ\text{C}</math> R.H. : <math>93 \pm 3\%</math> , Energized time: 1000±24 h After recovering 4~5 h under <math>25 \pm 2^\circ\text{C}</math>, the rated zero power resistance value <math>R_N'</math> shall be measured</p>

## 电压-电流关系曲线 Graph of Voltage vs. Current



## 产品特性曲线 Graph of Characteristics



## 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（Cl<sub>2</sub> .NH<sub>3</sub> .SO<sub>x</sub>.NO<sub>x</sub>）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 (.NH<sub>3</sub>.SO<sub>x</sub>.NO<sub>x</sub> Cl<sub>2</sub>) 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.