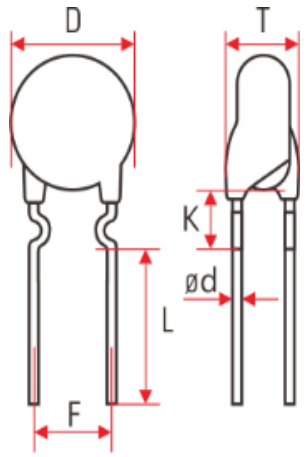
功率型NTC热敏电阻规格书
APPROVAL SPECIFICATIONS FOR POWER NTC THERMISTORS

1. 规格表
DATA SHEET



标志 Marking	NTC 15D-7

包封材料 Coating	酚醛树脂 Phenolic resin
包封颜色 Coating color	黑色 Black
脚型 Lead style	内弯脚 Inside kink lead
引线材质 Lead material	CP线 Tin-coated copper-clad steel wire

- Comply with RoHS 2.0
- Halogen-free
- Comply with REACH

产品编码 Part number		WNT07D150MAI320P0Z
规格描述 Description		NTC 15D-7 F5 I-Lead
客户料号 Customer P/N		
零功率电阻 (R25) Zero-Power Resistance (R25)		15Ω±20%
最大稳态电流 Maximum Current at 25℃ (Imax)		0.7A
B值 B-Value		2800±10%
散逸因素 (δ) Dissipation Factor (δ)		≥9mW/℃
热时常数(τ) Thermal Time Constant (τ)		≤27s
Imax下残余电阻 Residual Resistance at Imax		---
240VAC下最大允许使用电容值 Recommend Capacitance @ 240Vac		---
工作温度范围 Operating Temperature Range		-40℃～+150℃
尺寸规格 Dimensions	D	8mm max
	T	4.6mm max
	F	5mm±1.0mm
	L	20mm min
	ød	0.55mm±0.1mm
	K	5.0mm max

2. 简介

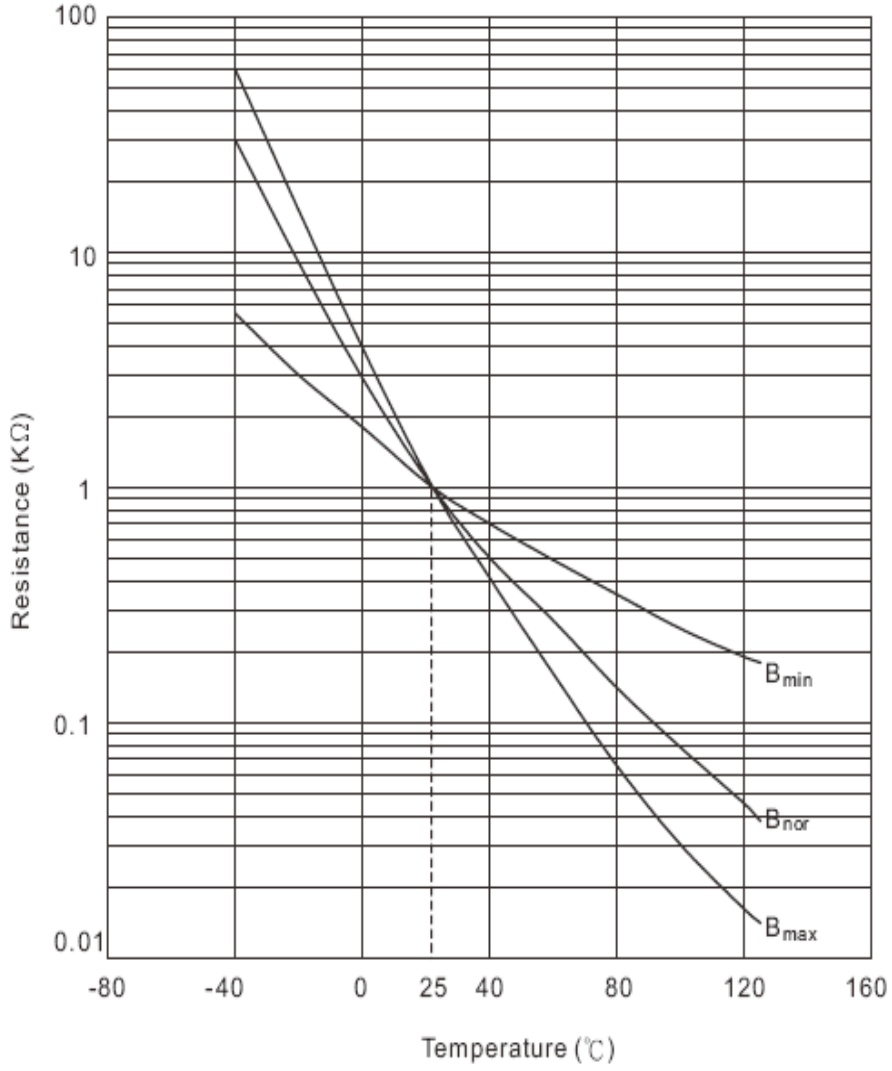
Introduction

负温度系数热敏电阻器是一种电阻值随着温度的升高而减小的热敏电阻器。其阻值的变化可以由外在的环境温度或是回路中电流引起的组件自热引起。这种电阻值随着温度改变的可预知性是热敏电阻器应用的基础。

NTC (Negative Temperature Coefficient) thermistors are resistors with large negative temperature coefficient. Change in resistance of the NTC thermistors can be brought about either externally by a change in ambient temperature or internally by self-heating resulting from a current flowing through the device. This predictable change in resistance as temperature changes is the basis for all applications of thermistors.

负温度系数热敏电阻器属于半导体的一种，通常是由锰、钴、镍、铜、铁等组成的过渡金属氧化物通过烧结后形成不同的形状和尺寸。通过改变半导体中元素的组成和本体尺寸，室温中产品的阻值范围可以从1Ω到10^6Ω，温度系数从-2%/℃到-6.5%/℃。

The semiconducting material of NTC thermistors usually consists of a sintered ceramic fabricated in a variety of shapes and sizes from a mixture of oxides chosen from Mn, Co, Ni, Cu, Fe and etc….By varying the composition and the size of the semi-conducting elements, resistance values between 100 and 10^6 ohms at room temperature can be achieved with temperature coefficients lying between -2% to -6.5% per ˚C.

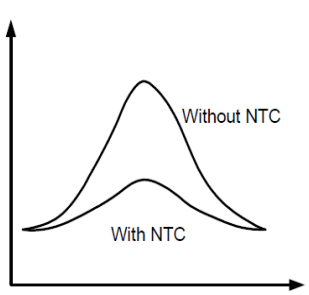


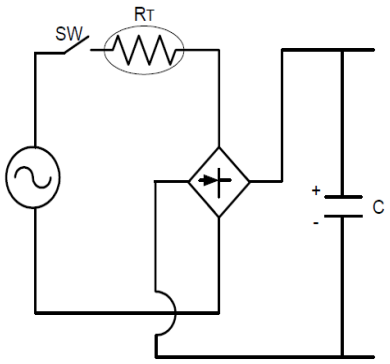
3. 应用说明
Application Notes

3.1. 浪涌电流抑制
Surge Current Suppressing

在包含有电容，电灯泡灯丝，荧光灯换流器和加热器等的电子电路中，在开关闭合的瞬间会产生一个比正常工作电流高出百倍的浪涌电流，利用NTC热敏电阻器的零功率电阻值来抑制开机瞬间的浪涌电流可以使开机瞬间的浪涌电流不致过大，并且在完成抑制浪涌电流作用以后，由于热敏电阻的自热效应，热敏电阻器本体温度升高，其电阻值将下降到非常小的程度，不会影响工作电流而使线路的正常工作。

If circuits consist of capacitor, bulb filament, heater, or inverter for fluorescent lamp, they will produce a surge current (10～100 times greater than a normal operating current) at the moment of switch's turn-on. Zero-power resistance of NTC thermistor limits the surge current during initial turn-on, and then heats up the thermistor following continuous flow of current. The thermistor's resistance is reduced to a very low level and allows operating current to flow during normal operation.

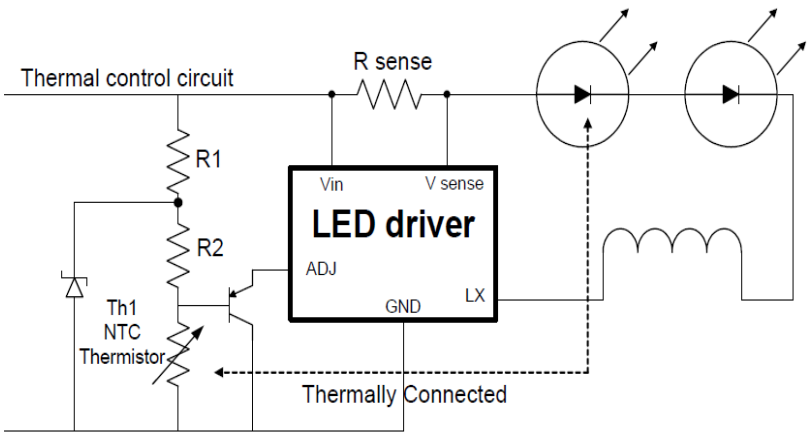




3.2. LED过热保护
Protecting LEDs from Thermal Stress

散热控制对高亮度LED控制十分重要。NTC热敏电阻可提供LED温度控制一个简单的解决方案，应用在LED控制电路，侦测过温时降低驱动电流，保护LED过热损坏。

Thermal control is a very important aspect of high brightness LED control. NTC thermistor, a simple solution of LED temperature control, is used in LED control circuit to reduce the current as temperature increases. It is possible that current rises following the increase of temperature to protect LEDs from overheating.



4. 术语

Terms and definitions

1) 热敏电阻器是一种电阻值对温度极为敏感的半导体元件，其主要特性是电阻值会随着温度的变化而变化。

A thermistor is a thermally sensitive semiconductor resistor, and its resistance changes following the change of temperature.

2) 负温度系数(NTC)热敏电阻器是一种电阻值随着温度的升高而减小的热敏电阻器。

Negative temperature coefficient (NTC) thermistor is a resistor whose resistance decreases following the increase of temperature.

3) 零功率电阻是在一定的温度条件下，电阻器因测量时产生的热量使得电阻器电阻值的变化小于0.1% 时,此电阻值称为零功率电阻。

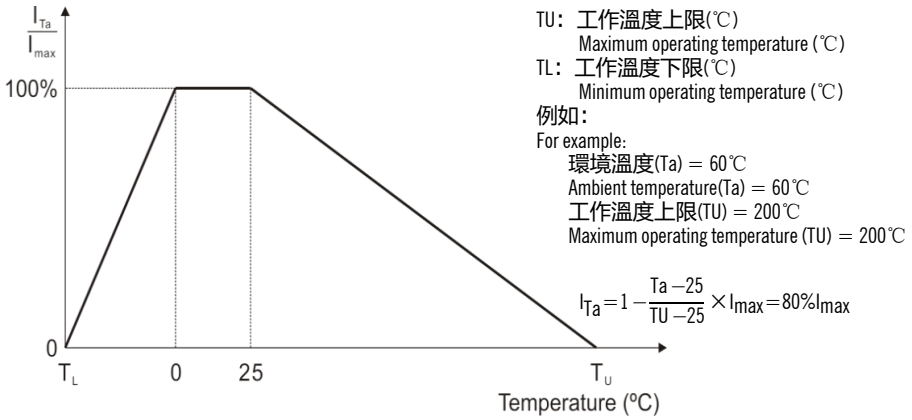
The zero-power resistance is the resistance value measured under specified temperature conditions, and the self-heating during measurement can be negligible or the change of resistance caused by self-heating during measurement is less than 0.1%.

4) 最大额定功耗是在热敏电阻在25℃的环境温度下长时间可施加的最大功率。

The maximum rated power dissipation is the maximum power rating applied to the thermistor continuously at 25℃.

下图所示在环境温度超过25℃或低于0℃时需做减额，曲线在TL和TU将线性减额到0%。

Please refer to derating curve below when the ambient temperature is over 25℃ or below 0℃. The curve is derated linearly to 0% at TL and TU.



TU：工作温度上限(℃)
Maximum operating temperature (℃)
TL：工作温度下限(℃)
Minimum operating temperature (℃)
例如：
For example:
環境溫度(Ta) = 60℃
Ambient temperature(Ta) = 60℃
工作温度上限(TU) = 200℃
Maximum operating temperature (TU) = 200℃

$$I_{Ta}=1-\frac{Ta-25}{TU-25}\times I_{max}=80\%I_{max}$$

5) 电阻-温度特性是热敏电阻器零功率电阻与本体温度之间的关系。

R-T characteristic is the relationship between zero-power resistance and body temperature of a thermistor.

其阻值计算公式如下：

The resistance law follows approximately the formula below:

$$R=R1e^{B(\frac{1}{T}-\frac{1}{T1})}$$

在这里，R和R1分别是在环境温度T和T1的条件下测得的零功率电阻值，其中温度用绝对温度(Kelvin)， B值是热敏感指数。

R and R1 are the values of a thermistor's zero-power resistance measured at temperature T and T1 respectively. The temperatures are expressed in absolute temperature (in Kelvins), and B is the thermal sensitivity index.

6) 电压-电流特性是指在25℃静止空气中，通过热敏电阻器两端的稳态电流与跨接的电压(直流或交流)之间的关系。

V-I characteristic is the relationship between dc or ac voltages across the thermistor and the applied steady-state current under 25℃ still air.

5. 型号命名方式

How to order

WNT	07	D	150	M	A	I	3	20	P0Z
①	②	③	④	⑤	⑥	⑦	⑧	⑨	⑩

序 NO.	特征码名称 FEATURE CODE	表达内容 EXPRESSION
①	产品类别PROSUCT TYPE	WNT： NTC热敏电阻(NTC THERMISTORS)
②	标称直径NOMINAL DIAMETER	07: 7mm
③	形状SHAPE	D: 圆形(Disc)
④	零功率电阻 ZERO POWER RESISTANCE	150: 15Ω
⑤	误差TOLERANCE	M: ±20%
⑥	类别TYPE	A： 功率型(Power Thermistor for Limiting Inrush Current)
⑦	脚型LEAD STYLE	I: 内弯脚Inside kink lead
⑧	脚距LEAD SPACING	3: 5mm
⑨	脚长LEAD LENGTH	20: 20mm
⑩	内部码INNER CODE	

6. 特点

Features

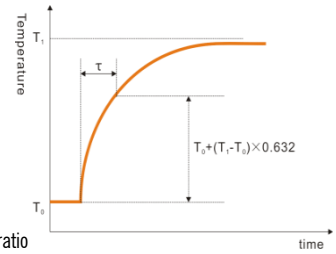
- ■ 小体积、大功率，抑制浪涌电流能力强
  Small size, large power and strong capability of surge current suppression
- ■ 反应速度快
  Fast response to surge current
- ■ 材料常数（B值）大，残余电阻小
  Large material constant (B value), small residual resistance
- ■ 寿命长，可靠性高
  Longevity of service, high reliability
- ■ 系列全，应用范围宽
  Integral series, wide range of applications

7. 应用范围

Scope of applications

- ■ 转换电源，开关电源，适配器，UPS电源
  Conversion power supply, switch power, Adapter, UPS power
- ■ 电子节能灯，LED 驱动电路，镇流器及各类加热器
  Electronic energy saving lamps, LED driver circuit, electronic ballast and all kinds of electric heater
- ■ 电子马达，变压器
  Electric motor, transformer
- ■ 各类显像管、显示器
  All kinks of CRT, displayer
- ■ 卤素灯和其它照明灯具
  Halogen lamp and other lighting lamps

6. 测量和试验
MEASUREMENT AND TEST

No.	项目 Item	标准 Specifications	试验方法 Testing Method
1	工作温度范围 Operating temperature range	-40℃～+150℃	工作温度范围是热敏电阻器能长时间工作在零功率的环境温度范围。工作温度范围定义最大值和最小值标示在各系列规格表中。 The operating temperature range is ambient temperature range for thermistor's continuous operation at zero-power. Limits of the upper and lower operating temperatures are specified in each series.
2	零功率电阻 Zero-power resistance (R25)	15Ω±20%	零功率电阻是指在25℃环境温度中所测得的电阻值(测试电压1.5Vdc)。 The zero-power resistance is the nominal value at standard temperature of 25℃ (Testing voltage: 1.5Vdc). 注意：需在常温条件下，放置1～2小时。 Note: after placing for 1～2 hours under ambient temperature
3	最大稳态电流 Maximum current at 25℃ (Imax)	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	在25℃温度下，使用最大稳态电流进行测试。 At 25℃, the maximum steady state current was used for testing.
4	热时常数 Thermal time constant (τ)	≤27s	在零功率情况下，热敏电阻本体温度的变化达到其最初温度与最终温度差的63.2%时所需的时间。 The thermal time constant is a 63.2% change of thermistor's body temperature from its initial temperature (T0) to specific temperature (T1) under zero-power conditions. 热时常数与温度变化率之间的关系 Thermal time constant and temperature change ratio 
5	散逸因素 Dissipation factor (δ)	≥9mW/℃	散逸因素是指在特定周围温度条件下，热敏电阻器消耗功率所造成的本体温度变化的比值。Dissipation factor is ration of thermistor's temperature change caused by its dissipation power under specific ambient temperature. 可由下列的公式表示 It can be expressed by the formula below, $\delta = V \times I \div (T_2 - T_1)$ 单位以mW/℃来表示，代表热敏电阻增加1℃所需要的功率 It is expressed in mW/℃ which stands for dissipation power for thermistor's increase of 1℃.
6	B值 B-value	2800±10%	B值是指电阻值随温度变化的热敏感指数（代表电阻随温度变化曲线的斜率），可由下面的公式表示: The B-value is an index of thermal sensitivity and represents slope of R/T curves. It can be showed by the formula below, $B = \frac{T_1 \times T_2}{T_2 - T_1} \times \log_e \frac{R_1}{R_2}$ R1/R2：温度T1/T2时的电阻值，单位为Ω Resistance in ohms (Ω) at temperature T1/T2 T1=298.15K (+25℃) T2=358.15K (+85℃) for B25/85
7	Solderability 可焊性	浸润部分上锡均匀，上锡面积≥95% The terminals shall be uniformly tinned, and its area≥95%	将引出端沾助焊剂后，浸入到温度为235±5℃、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IEC 60068-2-20 /GB2423.28试验Ta） Dipping the NTC terminals to a depth of 15mm in a soldering bath of 235±5℃ and to the place of 6mm far from NTC body for2-3s (See IEC 60068-2-20 /GB2423.28 Ta)

升温时间 Temperature rise time	τ	2τ	3τ	4τ	5τ	6τ	7τ
T0-T1温度变化率(%) Rate of change (%) for T0-T1	63.2	86.5	95	98.2	99.4	99.8	99.9

No.	项目 Item	标准 Specifications	试验方法 Testing Method
8	耐焊接热 Resistance to soldering heat	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	根据IEC 60068-2-20（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260±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，复测零功率电阻R25. Dipping the NTC terminals to a depth of 15mm in a soldering bath of 260±5℃ and to the place for 6mm below from NTC body for 10±1s.After recovering 4-5h under 25±2℃. The zero power resistance value R25 shall be measured. (See IEC 60068-2-20 /GB2423.28 Tb)
9	引出端强度 Strength of lead terminal	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	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，复测零功率电阻R25 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 zero power resistance value shall be measured. (See IEC 60068-2-21/GB2423.29 Ua / Ub)
10	温度循环测试 Temperature cycling testing	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	在-40±5℃和150±5℃的温度中各存放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。 The ambient temperature of -40±5℃ and 150±5℃ is stored for 30 minutes and circulated 5 times. Each high and low temperature cycle has a 5 minute transition in the 25±2℃ environment. 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R25. After recovering 4～5 h under 25±2℃, the rated zero power resistance value R25 shall be measured.
11	电循环测试 Electrical cycling testing	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	温度 Temperature: 25±2℃ / 循环次数 Cycles: 1000 / 通/断 On / Off: 1min / 5min / 测试电流 Test Current: Imax 样品置于室温（25±2℃）4～5小时后,测量其零功率电阻R25 After recovering 4～5h under 25±2℃, the rated zero power resistance value R25 shall be measured.
12	持久性测试 Load life testing	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	在温度25℃±2℃下，样品通过最大稳态电流，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R25. Under the ambient temperature 25℃±2℃, the sample passes the maximum steady state current, 1,000 ± 24 hours later, takes out at room temperature (25±2℃) 4-5 hours, measures its zero power resistance value R25.
13	耐湿性测试 Humidity Testing	无可见损伤 No visible mechanical damage. ΔR25/R25 ≤20%	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R25. In the temperature 40±2℃, relative humidity 93±3% environment placed 1,000 ± 24 hours after the removal at room temperature (25±2℃) 4-5 hours after the measurement of its zero power resistance value R25.

注意：请不要在下列条件下使用本元件，否则将可能导致产品性能衰退或产品损毁，甚至引发火灾：

Notice: 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.)

7. 贮存条件
STORAGE ENVIRONMENT

NTC热敏电阻绝缘包封层不是完美的密封形式，因此，请勿将NTC热敏电阻存放在腐蚀性气体中，尤其是存在氯气、硫气、酸、碱、盐等场所，同时应防潮。

The insulating coating of NTC thermistors does not form a perfect seal; therefore, do not use or store NTC thermistors in a corrosive atmosphere, especially where chloride gas, sulfide gas, acid, alkali, salt or the like are present. And avoid exposure to moisture.

NTC热敏电阻应存放在温度及相对湿度分别不超出40ºC及15～70%范围的场所。

Store the NTC thermistors where the temperature and relative humidity do not exceed 40 degrees centigrade and 15 to 70%.

请在6个月内使用NTC热敏电阻。超过6个月，在使用前确认其可焊性。

Use NTC thermistors within 6 months after delivered. for more than 6 months, confirm the solderability before use.

8. 编带规格
TAPING SPECIFICATIONS

FIG 1 (F＝5.0mm):

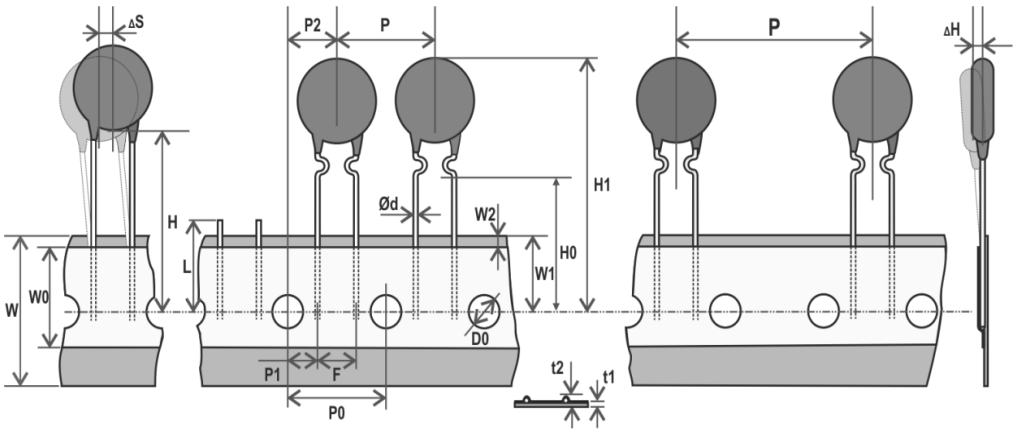
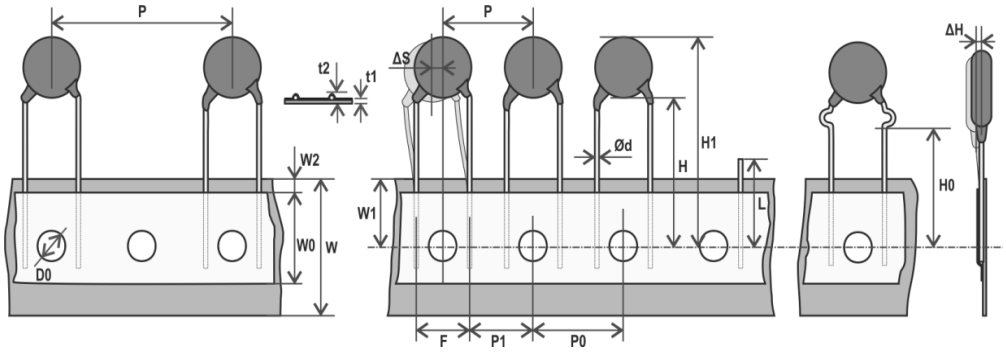


FIG 2 (F＝7.5mm / F＝10mm):



Unit: mm

Code	F	P	P0	P1	P2	W	W0	W1	W2	H	H0	D0	t1	t2	L	Δh	ΔS
Spec.	5	12.7	12.7	3.85	6.35	18.0	10.5	9.0	3	20	16.5	4.0	0.5	1.7	11	2	1.3
	7.5	25.4	12.7	8.95	12.7	18.0	10.5	9.0	3	20	16.5	4.0	0.5	1.7	11	2	1.3
	10	25.4	12.7	7.7	12.7	18.0	10.5	9.0	3	20	16.5	4.0	0.5	1.7	11	2	1.3
Tol,	±0.8	±1.0	±0.3	±0.7	±1.3	+1.5 -1.0	max	+0.8 -0.5	max	+1.5 -1.0	+1.5 -1.0	±0.2	±0.2	max	max	max	max