

# DATA SHEET

## NEGATIVE TEMPERATURE COEFFICIENT MONITOR/SPS/FAX

SP series

RoHS compliant & Halogen free



Product specification— November 18, 2019 V.0

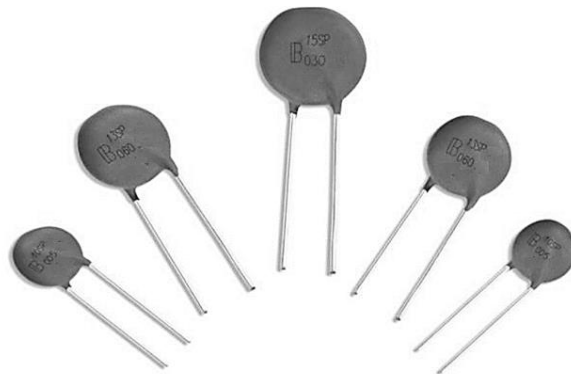


## Inrush Current Limiter -SP SERIES

## NTC Thermistors Data Sheet

## Features

- Effectively restrain surge.
- Low power loss under the stable state.
- Over-current wide control range and fast response.
- Thermal and electrical characteristics with high stability.
- Wide range of electrical specifications.
- RoHS& Halogen Free (HF) compliant.
- Safety certification: UL, E482628



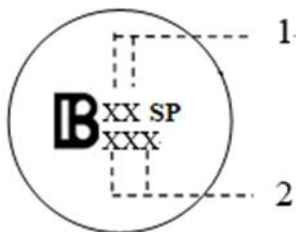
## Applications

- Monitor, Sps, Fax, Telecom, Adaptor etc.
- Power supply, Communications equipment etc.

## Part Number Code

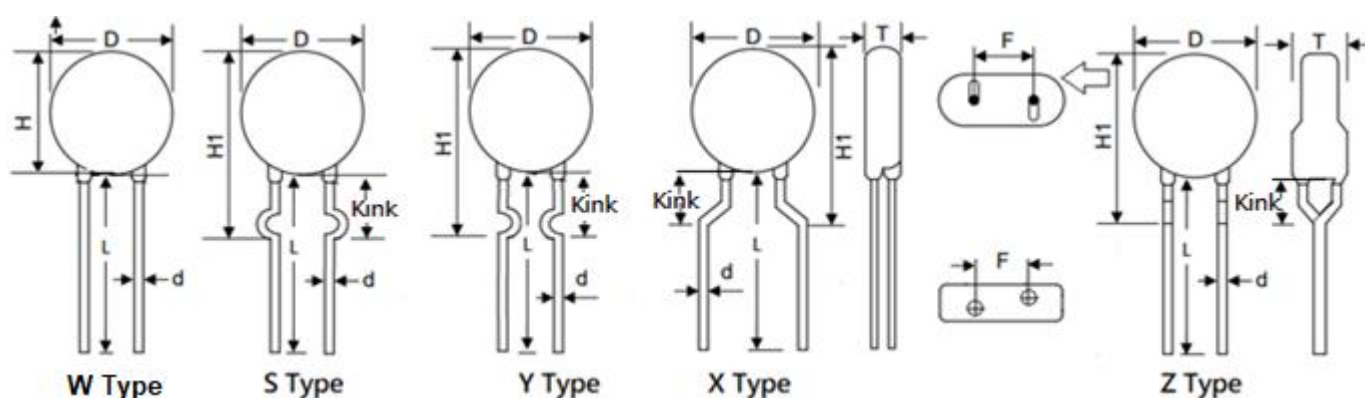
| N           | 20                                           | SP                      | 005                                             | M                | — | 5              | Y2                                                                                                   | TR                                                                                   |
|-------------|----------------------------------------------|-------------------------|-------------------------------------------------|------------------|---|----------------|------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------|
| NTC Product | Nominal Diameter<br>(Φ)                      | Surge Protection series | Zero Power Resistance At 25°C (R25)             | Tolerance Of R25 |   | RoHS Type      | Forming Type (Kink)                                                                                  | Packaging Type                                                                       |
|             | 08 Φ<br>10 Φ<br>13 Φ<br>15 Φ<br>20 Φ<br>25 Φ |                         | 0R7→0.7 Ω<br>2R5→2.5 Ω<br>012→12 Ω<br>120→120 Ω | L:15%<br>M:20%   |   | Default<br><5> | 2~3code<br><b>No Suffix :</b><br>Default straight<br><br><b>Others :</b><br>Refer to<br><Dimensions> | <b>No Suffix:</b><br>Bulk<br><b>TR :</b><br>Tape & Reel<br><b>TA :</b><br>Tape & Box |

## Marking



1 : Max Steady State Current  
2 : Zero Power Resistance Code  
at 25°C

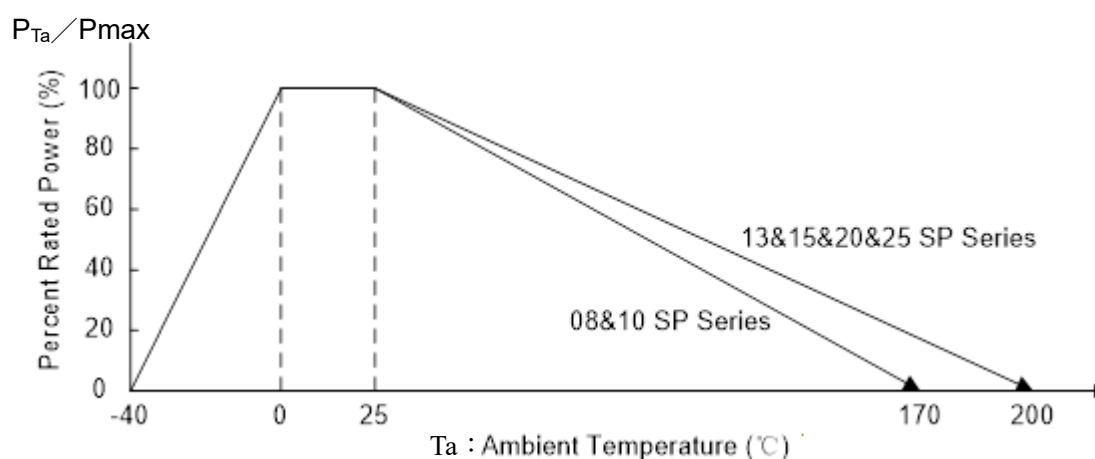
## Dimensions (Unit: mm)



| Diameter<br>$\Phi$ | Standard Forming Type |   |    |   |    | D      | H      | T      | F             | Kink          | d              | L      |
|--------------------|-----------------------|---|----|---|----|--------|--------|--------|---------------|---------------|----------------|--------|
|                    | W                     | S | Y  | X | Z  | (Max.) | (Max.) | (Max.) | ( $\pm 1.0$ ) | ( $\pm 1.0$ ) | ( $\pm 0.02$ ) | (Min.) |
| 08 $\Phi$          | Default<br>*W4        |   | Y1 |   | Z2 | 9.5    | 10.5   | 5.0    | 5.0           | 5.0           | 0.8            | 25.0   |
| 10 $\Phi$          | Default<br>*W4        |   | Y1 |   | Z2 | 11.5   | 12.5   | 5.0    | 5.0           | 5.0           | 0.8            | 25.0   |
| 13 $\Phi$          | Default<br>*W6        |   | Y2 |   | Z4 | 15.0   | 16.0   | 6.0    | 7.5           | 5.0           | 1.0            | 25.0   |
| 15 $\Phi$          | Default<br>*W6        |   | Y2 |   | Z4 | 17.0   | 18.0   | 6.0    | 7.5           | 5.0           | 1.0            | 25.0   |
| 20 $\Phi$          | Default<br>*W6        |   | Y2 |   | Z4 | 22.0   | 23.0   | 6.0    | 7.5           | 5.0           | 1.0            | 25.0   |
| 25 $\Phi$          | Default<br>*W6        |   | Y2 |   | Z4 | 27.0   | 28.0   | 6.0    | 7.5           | 5.0           | 1.0            | 25.0   |

Remarks: " \*W " type lead is the default straight lead shape, PN without Forming type code

## Maximum Power Rating



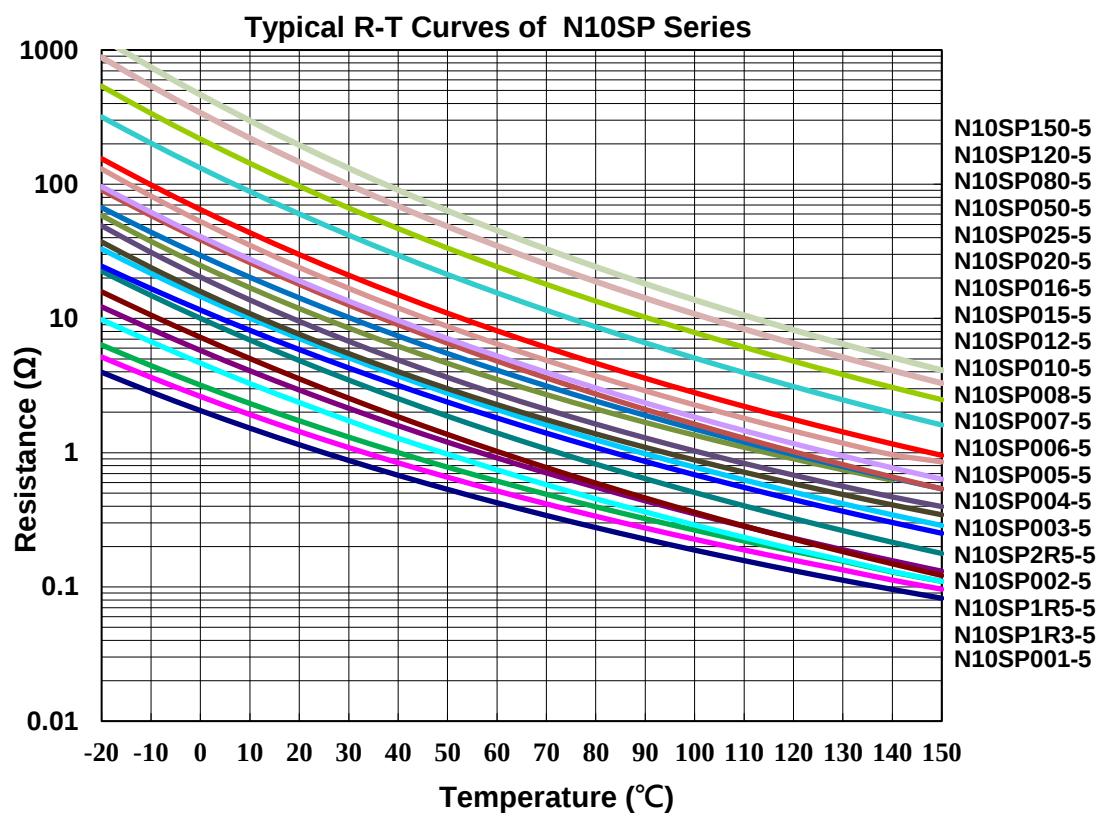
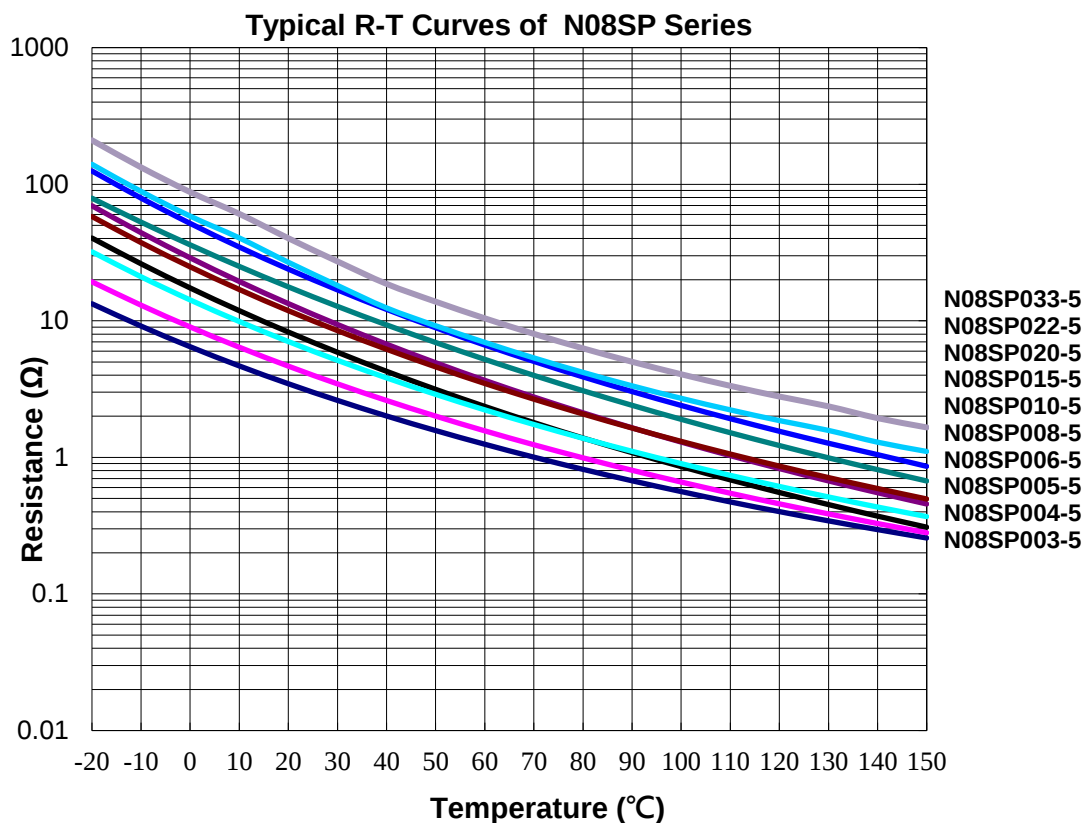
## Electrical Characteristics

| Diameter | Part Number | Zero Power Resistance at 25℃ | Max. Steady State Current | Recommend Capacitance at 340Vdc | Thermal Time Constant | Thermal Dissipation Constant | Max. Steady Power | Operating Temperature Range        |
|----------|-------------|------------------------------|---------------------------|---------------------------------|-----------------------|------------------------------|-------------------|------------------------------------|
|          |             | R25(Ω)                       | (A)                       | (μF)                            | (Sec)                 | (mW/℃)                       | (W)               | T <sub>L</sub> ~T <sub>u</sub> (℃) |
| 08Φ      | N08SP003    | 3                            | 3                         | 120                             | 48                    | 12                           | 2                 | -40~+170                           |
|          | N08SP004    | 4                            | 3                         | 120                             | 45                    | 12                           | 2                 | -40~+170                           |
|          | N08SP005    | 5                            | 3                         | 120                             | 48                    | 9                            | 2                 | -40~+170                           |
|          | N08SP006    | 6                            | 3                         | 120                             | 45                    | 9                            | 2                 | -40~+170                           |
|          | N08SP008    | 8                            | 3                         | 120                             | 45                    | 9                            | 2                 | -40~+170                           |
|          | N08SP010    | 10                           | 3                         | 120                             | 45                    | 9                            | 2                 | -40~+170                           |
|          | N08SP015    | 15                           | 2                         | 60                              | 45                    | 12                           | 2                 | -40~+170                           |
|          | N08SP020    | 20                           | 2                         | 60                              | 45                    | 12                           | 2                 | -40~+170                           |
|          | N08SP022    | 22                           | 2                         | 60                              | 45                    | 12                           | 2                 | -40~+170                           |
| 10Φ      | N10SP001    | 1                            | 5                         | 330                             | 65                    | 17                           | 2.5               | -40~+170                           |
|          | N10SP1R3    | 1.3                          | 5                         | 330                             | 63                    | 17                           | 2.5               | -40~+170                           |
|          | N10SP1R5    | 1.5                          | 5                         | 330                             | 60                    | 15                           | 2.5               | -40~+170                           |
|          | N10SP002    | 2                            | 5                         | 330                             | 55                    | 12                           | 2.5               | -40~+170                           |
|          | N10SP2R5    | 2.5                          | 5                         | 330                             | 58                    | 11                           | 2.5               | -40~+170                           |
|          | N10SP003    | 3                            | 5                         | 330                             | 60                    | 11                           | 2.5               | -40~+170                           |
|          | N10SP004    | 4                            | 4                         | 330                             | 62                    | 10                           | 2.5               | -40~+170                           |
|          | N10SP005    | 5                            | 4                         | 330                             | 58                    | 10                           | 2.5               | -40~+170                           |
|          | N10SP006    | 6                            | 3                         | 330                             | 59                    | 10                           | 2.5               | -40~+170                           |
|          | N10SP007    | 7                            | 3                         | 330                             | 60                    | 13                           | 2.5               | -40~+170                           |
|          | N10SP008    | 8                            | 3                         | 330                             | 59                    | 12                           | 2.5               | -40~+170                           |
|          | N10SP010    | 10                           | 3                         | 330                             | 56                    | 12                           | 2.5               | -40~+170                           |
|          | N10SP012    | 12                           | 2                         | 230                             | 58                    | 11                           | 2.5               | -40~+170                           |
|          | N10SP015    | 15                           | 2                         | 230                             | 62                    | 11                           | 2.5               | -40~+170                           |
|          | N10SP016    | 16                           | 2                         | 230                             | 62                    | 11                           | 2.5               | -40~+170                           |
|          | N10SP020    | 20                           | 2                         | 230                             | 60                    | 12                           | 2.5               | -40~+170                           |
|          | N10SP025    | 25                           | 2                         | 230                             | 56                    | 12                           | 2.5               | -40~+170                           |
|          | N10SP050    | 50                           | 2                         | 230                             | 58                    | 10                           | 2.5               | -40~+170                           |
|          | N10SP080    | 80                           | 1                         | 120                             | 55                    | 10                           | 2.5               | -40~+170                           |
|          | N10SP120    | 120                          | 1                         | 120                             | 60                    | 10                           | 2.5               | -40~+170                           |

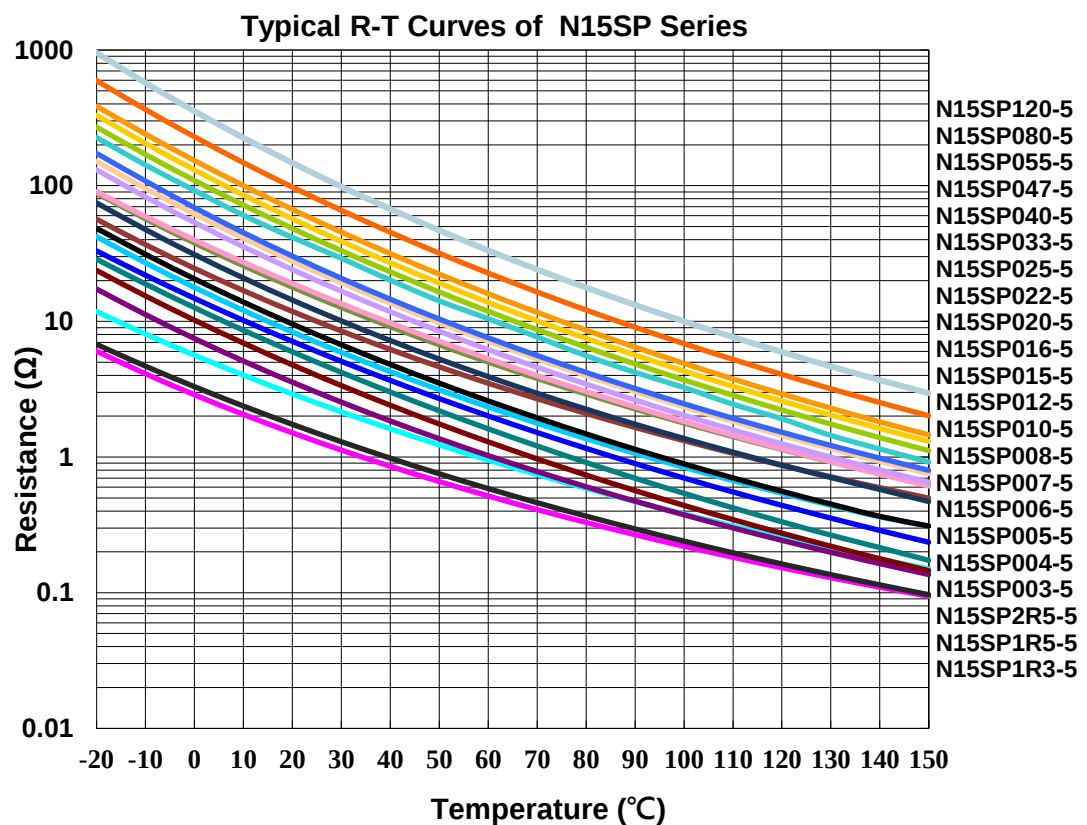
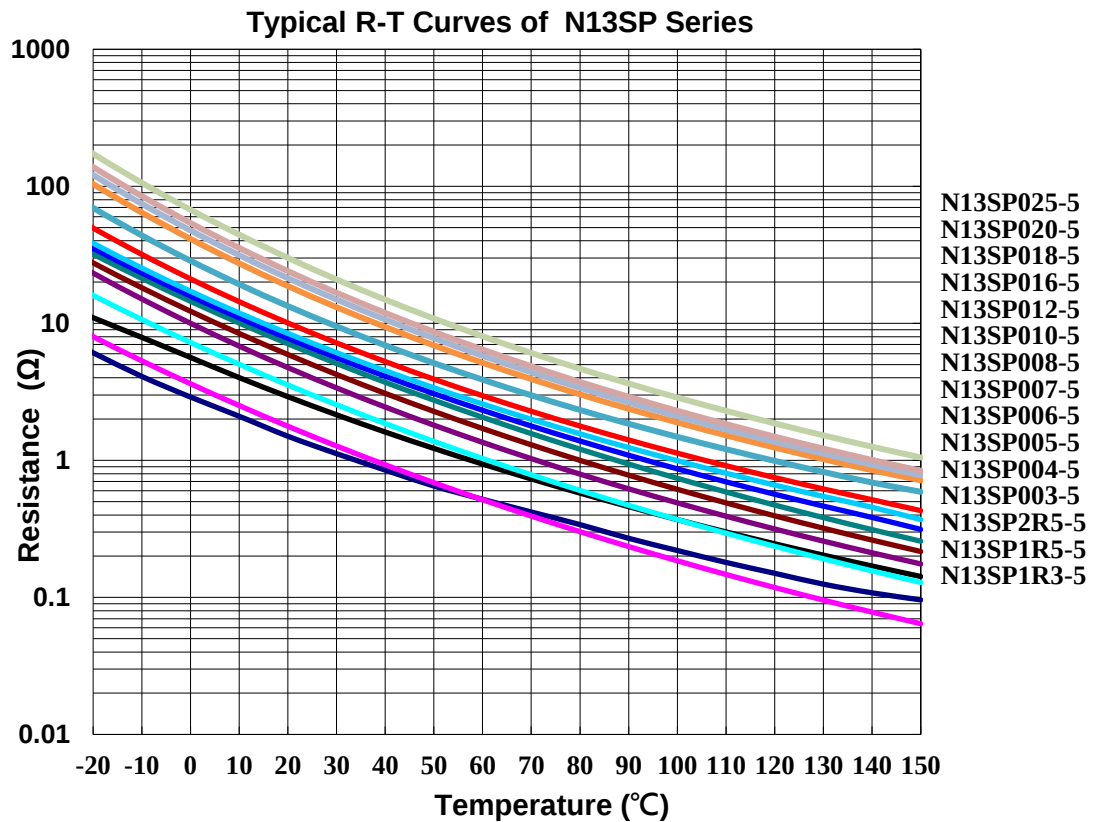
| Diameter | Part Number | Zero Power Resistance at 25°C | Max. Steady State Current | Recommend Capacitance at 340Vdc | Thermal Time Constant | Thermal Dissipation Constant | Max. Steady Power | Operating Temperature Range         |
|----------|-------------|-------------------------------|---------------------------|---------------------------------|-----------------------|------------------------------|-------------------|-------------------------------------|
|          |             | R25(Ω)                        | (A)                       | (μF)                            | (Sec)                 | (mW/°C)                      | (W)               | T <sub>L</sub> ~T <sub>u</sub> (°C) |
| 13Φ      | N13SP1R3    | 1.3                           | 7                         | 430                             | 91                    | 15                           | 3                 | -40~+200                            |
|          | N13SP1R5    | 1.5                           | 7                         | 430                             | 90                    | 15                           | 3                 | -40~+200                            |
|          | N13SP2R5    | 2.5                           | 6                         | 430                             | 85                    | 16                           | 3                 | -40~+200                            |
|          | N13SP003    | 3                             | 5                         | 430                             | 93                    | 16                           | 3                 | -40~+200                            |
|          | N13SP004    | 4                             | 5                         | 430                             | 91                    | 16                           | 3                 | -40~+200                            |
|          | N13SP005    | 5                             | 5                         | 430                             | 93                    | 17                           | 3                 | -40~+200                            |
|          | N13SP006    | 6                             | 5                         | 430                             | 92                    | 16                           | 3                 | -40~+200                            |
|          | N13SP007    | 7                             | 5                         | 430                             | 91                    | 16                           | 3                 | -40~+200                            |
|          | N13SP008    | 8                             | 4                         | 430                             | 91                    | 15                           | 3                 | -40~+200                            |
|          | N13SP010    | 10                            | 4                         | 430                             | 87                    | 14                           | 3                 | -40~+200                            |
|          | N13SP012    | 12                            | 4                         | 330                             | 82                    | 18                           | 3                 | -40~+200                            |
|          | N13SP016    | 16                            | 3                         | 330                             | 87                    | 15                           | 3                 | -40~+200                            |
|          | N13SP018    | 18                            | 3                         | 330                             | 90                    | 17                           | 3                 | -40~+200                            |
|          | N13SP020    | 20                            | 3                         | 330                             | 93                    | 17                           | 3                 | -40~+200                            |
|          | N13SP060    | 60                            | 2                         | 330                             | 93                    | 17                           | 3                 | -40~+200                            |
| 15Φ      | N15SP001    | 1                             | 8                         | 640                             | 105                   | 20                           | 4                 | -40~+200                            |
|          | N15SP1R3    | 1.3                           | 8                         | 640                             | 107                   | 20                           | 4                 | -40~+200                            |
|          | N15SP1R5    | 1.5                           | 8                         | 640                             | 107                   | 19                           | 4                 | -40~+200                            |
|          | N15SP2R5    | 2.5                           | 8                         | 640                             | 104                   | 20                           | 4                 | -40~+200                            |
|          | N15SP003    | 3                             | 7                         | 640                             | 105                   | 20                           | 4                 | -40~+200                            |
|          | N15SP004    | 4                             | 6                         | 640                             | 104                   | 18                           | 4                 | -40~+200                            |
|          | N15SP005    | 5                             | 6                         | 640                             | 110                   | 20                           | 4                 | -40~+200                            |
|          | N15SP006    | 6                             | 5                         | 640                             | 102                   | 20                           | 4                 | -40~+200                            |
|          | N15SP007    | 7                             | 5                         | 640                             | 99                    | 21                           | 4                 | -40~+200                            |
|          | N15SP008    | 8                             | 5                         | 640                             | 103                   | 15                           | 4                 | -40~+200                            |
|          | N15SP010    | 10                            | 5                         | 640                             | 103                   | 19                           | 4                 | -40~+200                            |
|          | N15SP012    | 12                            | 4                         | 560                             | 102                   | 21                           | 4                 | -40~+200                            |
|          | N15SP015    | 15                            | 4                         | 560                             | 101                   | 17                           | 4                 | -40~+200                            |
|          | N15SP016    | 16                            | 4                         | 560                             | 102                   | 22                           | 4                 | -40~+200                            |
|          | N15SP020    | 20                            | 4                         | 560                             | 101                   | 20                           | 4                 | -40~+200                            |
|          | N15SP025    | 25                            | 3                         | 560                             | 100                   | 21                           | 4                 | -40~+200                            |
|          | N15SP033    | 33                            | 3                         | 560                             | 100                   | 21                           | 4                 | -40~+200                            |
|          | N15SP040    | 40                            | 3                         | 560                             | 101                   | 20                           | 4                 | -40~+200                            |
|          | N15SP047    | 47                            | 3                         | 560                             | 102                   | 21                           | 4                 | -40~+200                            |
|          | N15SP055    | 55                            | 3                         | 560                             | 102                   | 21                           | 4                 | -40~+200                            |
|          | N15SP120    | 120                           | 2                         | 560                             | 104                   | 20                           | 4                 | -40~+200                            |

| Diameter | Part Number | Zero Power Resistance at 25°C | Max. Steady State Current | Recommend Capacitance at 340Vdc | Thermal Time Constant | Thermal Dissipation Constant | Max. Steady Power | Operating Temperature Range         |
|----------|-------------|-------------------------------|---------------------------|---------------------------------|-----------------------|------------------------------|-------------------|-------------------------------------|
|          |             | R25(Ω)                        | (A)                       | (μF)                            | (Sec)                 | (mW/°C)                      | (W)               | T <sub>L</sub> ~T <sub>u</sub> (°C) |
| 20Φ      | N20SP0R7    | 0.7                           | 12                        | 820                             | 145                   | 25                           | 5                 | -40~+200                            |
|          | N20SP001    | 1                             | 10                        | 820                             | 135                   | 25                           | 5                 | -40~+200                            |
|          | N20SP1R3    | 1.3                           | 8                         | 820                             | 144                   | 24                           | 5                 | -40~+200                            |
|          | N20SP002    | 2                             | 8                         | 820                             | 140                   | 21                           | 5                 | -40~+200                            |
|          | N20SP2R5    | 2.5                           | 8                         | 820                             | 120                   | 23                           | 5                 | -40~+200                            |
|          | N20SP004    | 4                             | 8                         | 820                             | 135                   | 25                           | 5                 | -40~+200                            |
|          | N20SP005    | 5                             | 7                         | 820                             | 144                   | 24                           | 5                 | -40~+200                            |
|          | N20SP006    | 6                             | 6                         | 820                             | 136                   | 24                           | 5                 | -40~+200                            |
|          | N20SP007    | 7                             | 6                         | 820                             | 132                   | 24                           | 5                 | -40~+200                            |
|          | N20SP010    | 10                            | 6                         | 820                             | 135                   | 23                           | 5                 | -40~+200                            |
|          | N20SP012    | 12                            | 5                         | 820                             | 132                   | 25                           | 5                 | -40~+200                            |
|          | N20SP016    | 16                            | 6                         | 740                             | 127                   | 25                           | 5                 | -40~+200                            |
|          | N20SP020    | 20                            | 6                         | 740                             | 127                   | 22                           | 5                 | -40~+200                            |
|          | N20SP025    | 25                            | 6                         | 740                             | 127                   | 22                           | 5                 | -40~+200                            |
|          | N20SP060    | 60                            | 3                         | 740                             | 102                   | 21                           | 5                 | -40~+200                            |
|          | N20SP120    | 120                           | 2                         | 740                             | 142                   | 24                           | 5                 | -40~+200                            |
| 25Φ      | N25SP1R5    | 1.5                           | 15                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP002    | 2                             | 15                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP2R5    | 2.5                           | 15                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP003    | 3                             | 15                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP004    | 4                             | 14                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP4R7    | 4.7                           | 13                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP005    | 5                             | 12                        | 1240                            | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP6R8    | 6.8                           | 10.5                      | 820                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP007    | 7                             | 10                        | 820                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP008    | 8                             | 9                         | 820                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP010    | 10                            | 8                         | 820                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP012    | 12                            | 7.5                       | 820                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP015    | 15                            | 6.5                       | 740                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP018    | 18                            | 5.5                       | 740                             | 150                   | 30                           | 6.5               | -40~+200                            |
|          | N25SP020    | 20                            | 5                         | 740                             | 150                   | 30                           | 6.5               | -40~+200                            |

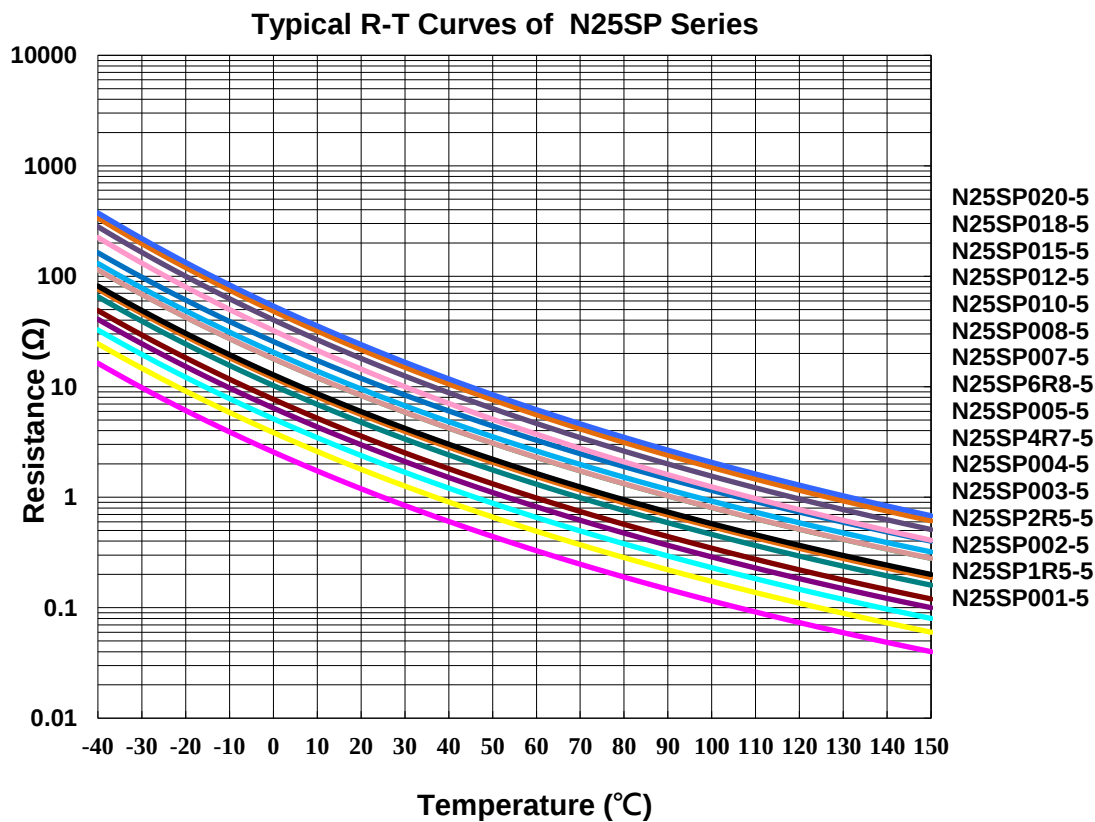
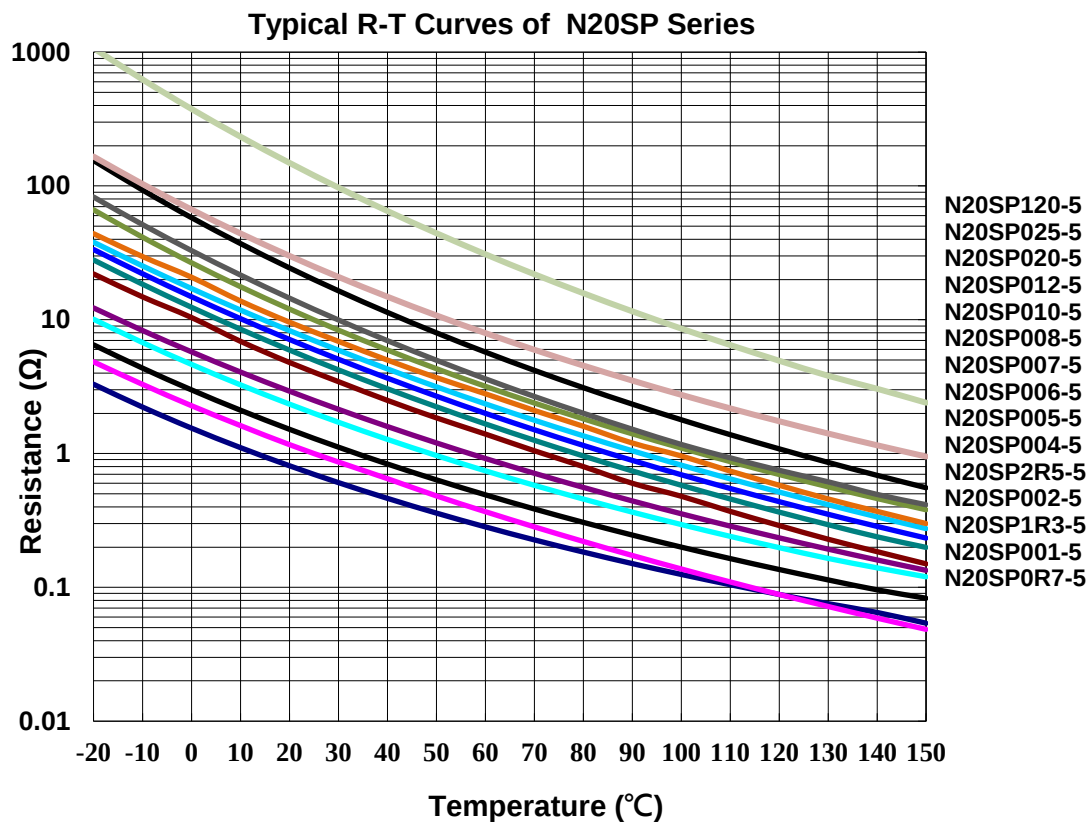
## Resistance–Temperature Characteristic Curves



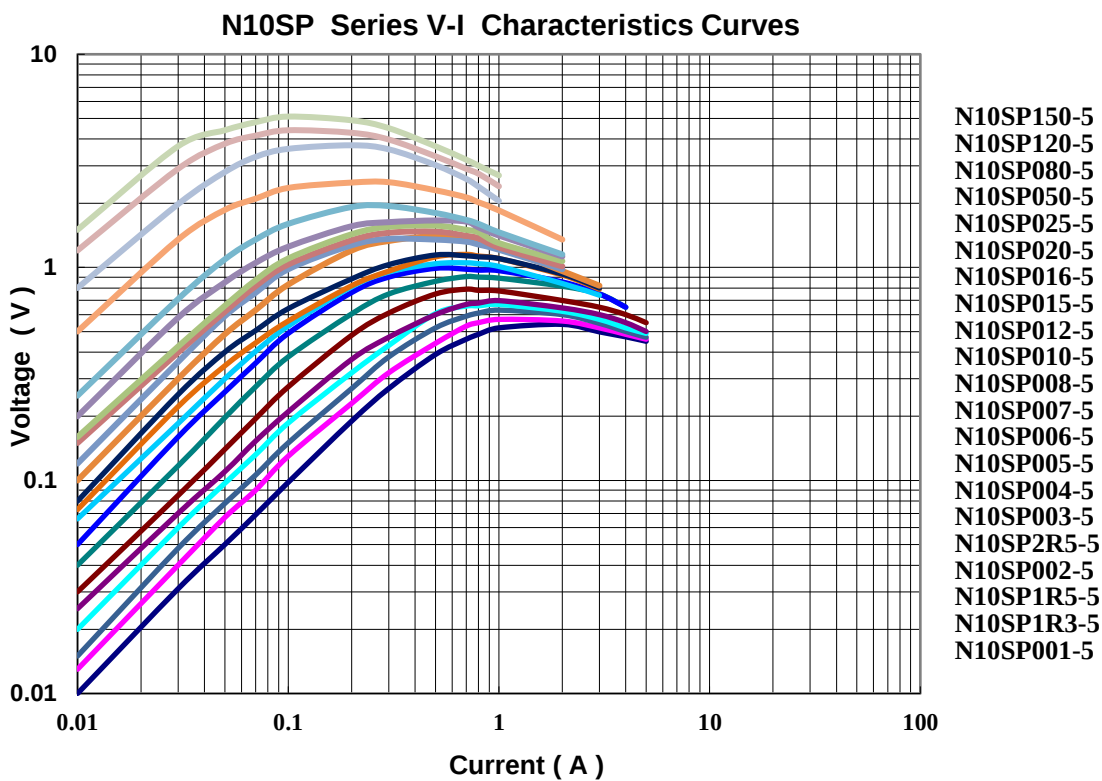
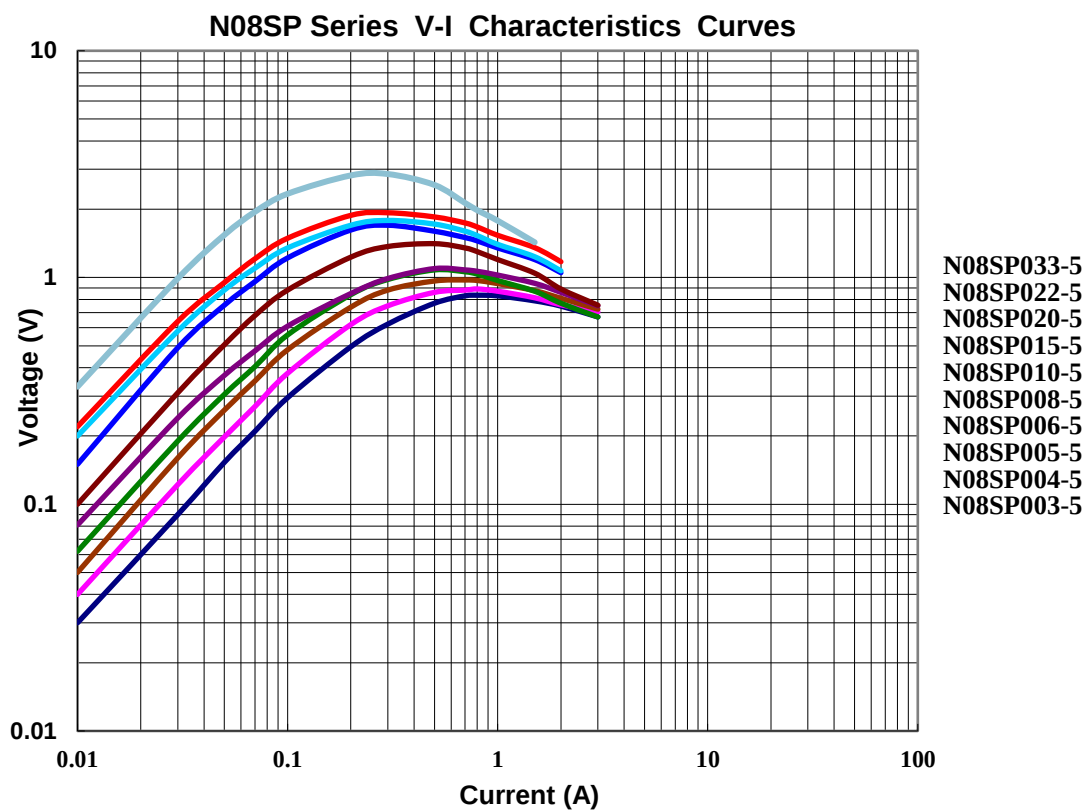
## Resistance–Temperature Characteristic Curves



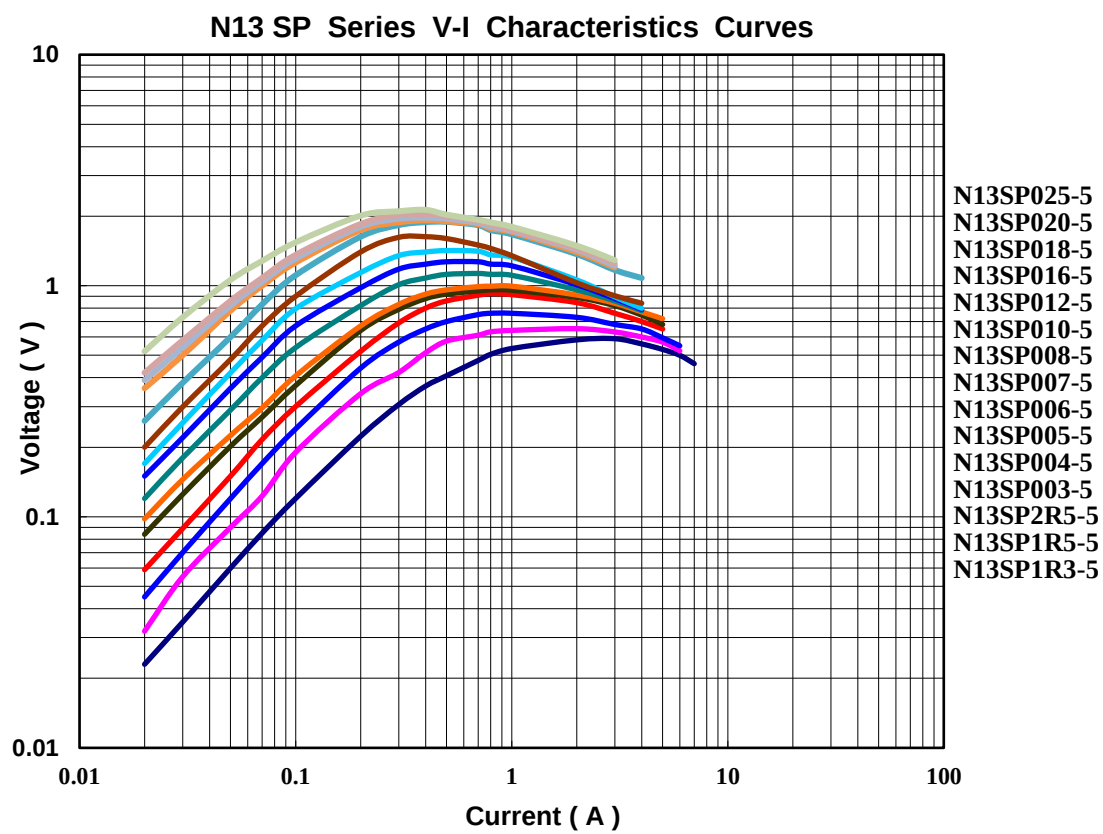
## Resistance–Temperature Characteristic Curves

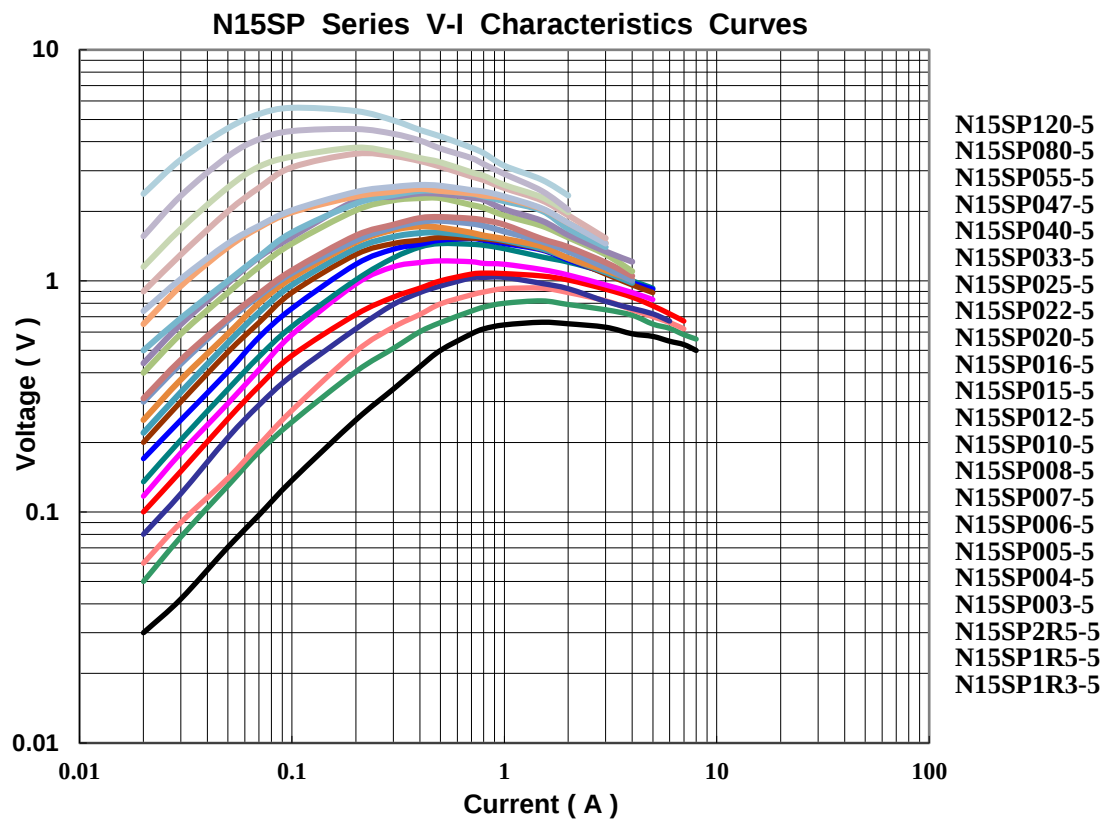


## V-I Characteristic Curves

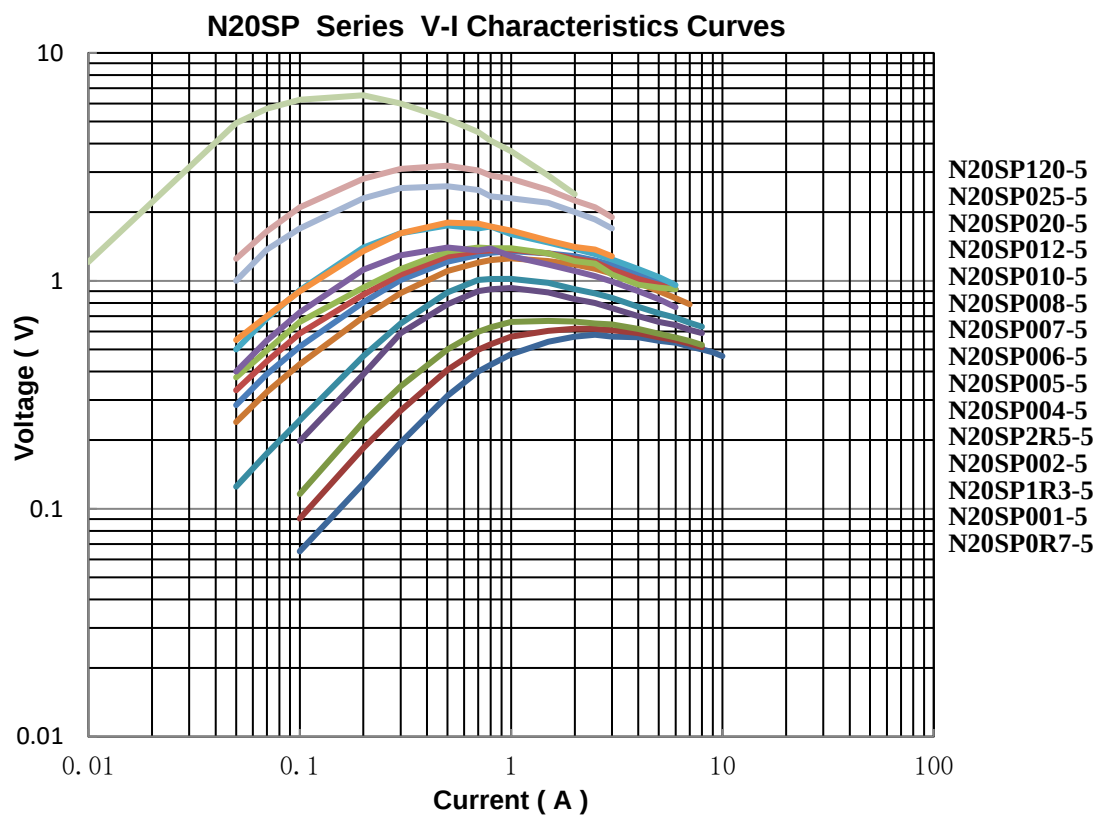


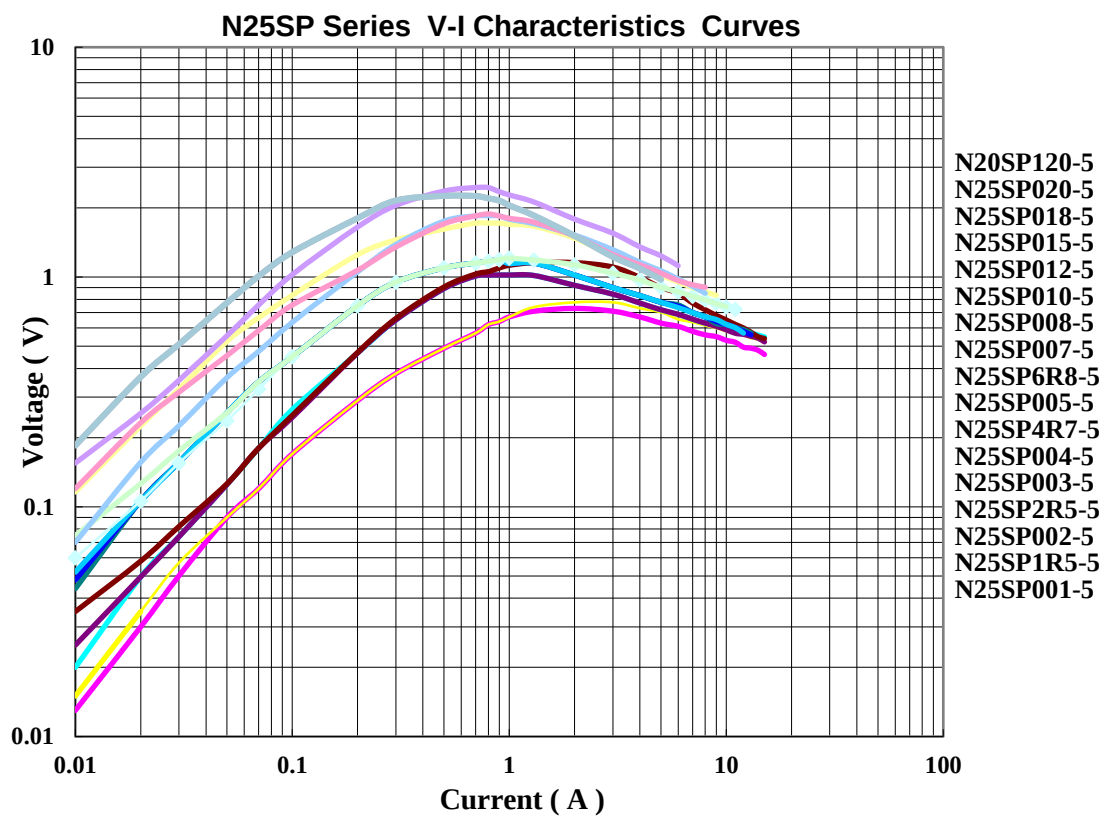
## V-I Characteristic Curves





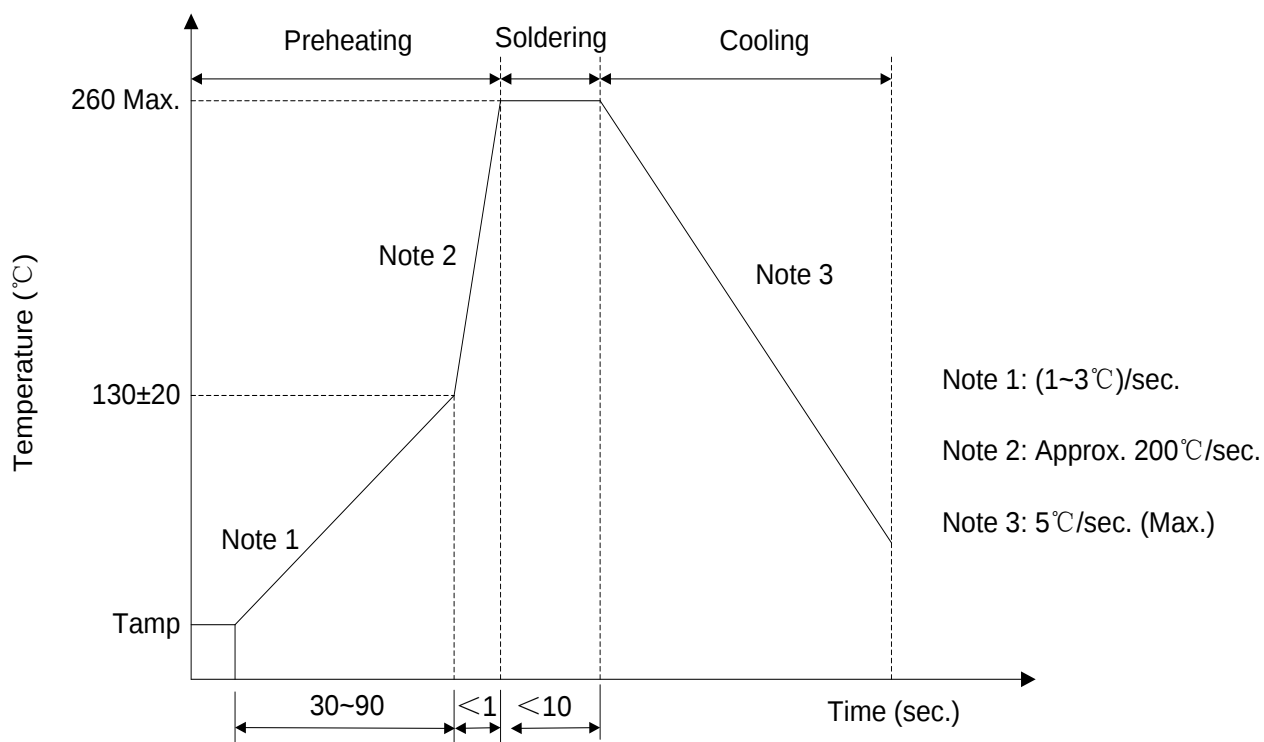
## V-I Characteristic Curves





## Soldering Recommendation

### Wave Soldering Recommendation



### Recommended Reworking Conditions with Soldering Iron

| Item                              | Conditions      |
|-----------------------------------|-----------------|
| Temperature of Soldering Iron-tip | 360°C (max.)    |
| Soldering Time                    | 3 seconds(max.) |
| Distance from Thermistor          | 2mm (min.)      |

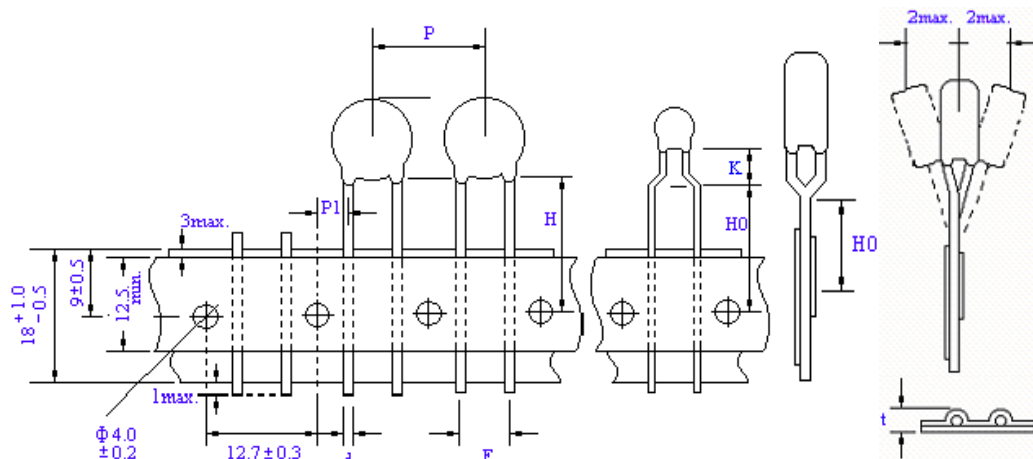
## Packaging

### ■ Tape Packing (Tape Reel or Tape Box)

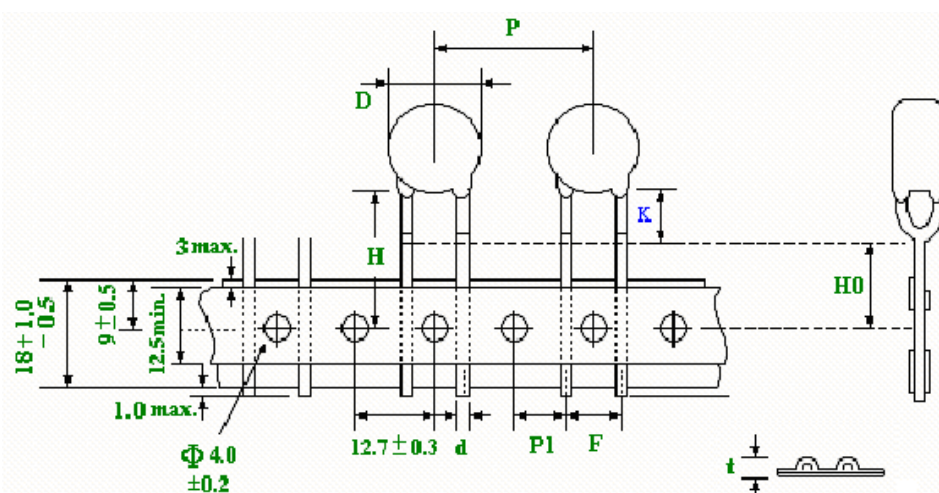
#### Tape Reel or Tape Box

(Unit: mm)

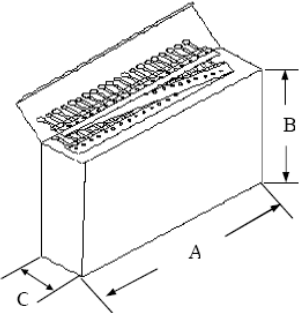
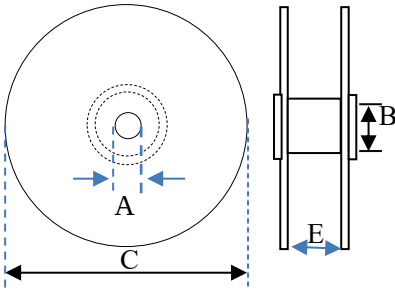
**P=12.7**



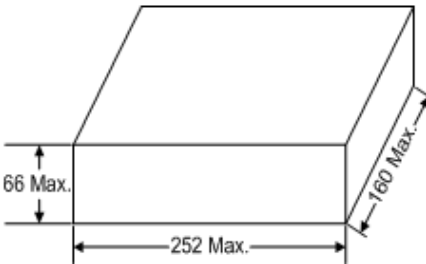
**P=25.4**



| Lead type            |                  | P<br>(mm) | F<br>(mm) | TR type<br>(Tape & Reel) | TA type<br>(Tape & Box) |
|----------------------|------------------|-----------|-----------|--------------------------|-------------------------|
| 05Φ(NTB)             | X4               | 12.7      | 5.0       | 1000pcs                  | 1000pcs                 |
| 08Φ(NTD)<br>10Φ(NTE) | Default straight | 12.7      | 5.0       | 1000pcs                  | 1000pcs                 |
|                      | Y1               | 12.7      | 5.0       | 1000pcs                  | 1000pcs                 |
|                      | Z2               | 12.7      | 5.0       | 1000pcs                  | 1000pcs                 |
|                      | W5               | 25.4      | 7.5       | 500 pcs                  | 500 pcs                 |
| 13Φ(NTD)             | Default straight | 25.4      | 7.5       | 500 pcs                  | 500 pcs                 |
| 15Φ(NTE)             | Y2               | 25.4      | 7.5       | 500 pcs                  | 500 pcs                 |
| 20Φ(NTL)             | Z4               | 25.4      | 7.5       | 500 pcs                  | 500 pcs                 |

| Symbol                                                                                                 | Dimension (mm) |     | Symbol                                                                                                   | Dimension (mm) |     |
|--------------------------------------------------------------------------------------------------------|----------------|-----|----------------------------------------------------------------------------------------------------------|----------------|-----|
| TA type (Tape & Box)  | A              | 330 | TR type (Tape & Reel)  | A              | 30  |
|                                                                                                        | B              | 260 |                                                                                                          | B              | 76  |
|                                                                                                        | C              | 50  |                                                                                                          | C              | 340 |
|                                                                                                        |                |     |                                                                                                          | E              | 43  |

Bulk Packing

| Bulk (Unit: mm)                                                                     | Quantity |            |
|-------------------------------------------------------------------------------------|----------|------------|
|  | 08Φ      | 800pcs/box |
|                                                                                     | 10Φ      | 800pcs/box |
|                                                                                     | 13Φ      | 400pcs/box |
|                                                                                     | 15Φ      | 400pcs/box |
|                                                                                     | 20Φ      | 200pcs/box |
|                                                                                     | 25Φ      | 200pcs/box |

Warehouse Storage Conditions

- Storage temperature: -10℃~+40℃.
- Relative humidity: ≤75%RH.
- Keep away from corrosive atmosphere and sunlight.
- Period of Storage: 1 year

# Mouser Electronics

Authorized Distributor

Click to View Pricing, Inventory, Delivery & Lifecycle Information:

Yageo:

[BKN15SP033M-5](#) [BKN10SP010L-5](#) [BKN10SP1R3L-5](#) [BKN15SP006M-5](#) [BKN08SP006M-5](#) [BKN15SP004M-5](#)  
[BKN13SP012L-5](#) [BKN13SP008M-5](#) [BKN10SP007M-5](#) [BKN08SP006L-5](#) [BKN08SP033L-5](#) [BKN13SP005M-5](#)  
[BKN15SP003M-5](#) [BKN08SP022L-5](#) [BKN08SP008M-5](#) [BKN15SP1R5L-5](#) [BKN10SP007L-5](#) [BKN10SP080L-5](#)  
[BKN10SP2R5M-5](#) [BKN10SP050M-5](#) [BKN15SP003L-5](#) [BKN15SP022M-5](#) [BKN13SP006M-5](#) [BKN10SP001M-5](#)  
[BKN13SP012M-5](#) [BKN08SP010M-5](#) [BKN10SP2R5L-5](#) [BKN15SP005M-5](#) [BKN15SP040M-5](#) [BKN08SP015L-5](#)  
[BKN10SP005M-5](#) [BKN10SP150L-5](#) [BKN15SP033L-5](#) [BKN10SP008L-5](#) [BKN15SP055L-5](#) [BKN15SP006L-5](#)  
[BKN10SP015M-5](#) [BKN10SP008M-5](#) [BKN15SP040L-5](#) [BKN10SP1R3M-5](#) [BKN08SP020M-5](#) [BKN15SP007L-5](#)  
[BKN15SP008M-5](#) [BKN15SP007M-5](#) [BKN13SP016L-5](#) [BKN10SP1R5L-5](#) [BKN13SP018M-5](#) [BKN25SP004L-5](#)  
[BKN10SP001L-5](#) [BKN08SP020L-5](#) [BKN13SP010L-5](#) [BKN08SP003L-5](#) [BKN13SP005L-5](#) [BKN25SP010M-5](#)  
[BKN10SP016M-5](#) [BKN15SP012L-5](#) [BKN20SP004L-5](#) [BKN15SP120M-5](#) [BKN15SP025M-5](#) [BKN08SP022M-5](#)  
[BKN20SP006M-5](#) [BKN10SP002L-5](#) [BKN10SP012M-5](#) [BKN08SP004L-5](#) [BKN15SP020L-5](#) [BKN08SP015M-5](#)  
[BKN15SP005L-5](#) [BKN10SP020L-5](#) [BKN10SP025M-5](#) [BKN10SP020M-5](#) [BKN15SP022L-5](#) [BKN15SP004L-5](#)  
[BKN13SP016M-5](#) [BKN10SP012L-5](#) [BKN15SP010L-5](#) [BKN10SP120L-5](#) [BKN13SP008L-5](#) [BKN10SP120M-5](#)  
[BKN13SP1R3M-5](#) [BKN13SP007L-5](#) [BKN20SP012M-5](#) [BKN08SP005L-5](#) [BKN13SP007M-5](#) [BKN08SP005M-5](#)  
[BKN13SP1R5L-5](#) [BKN08SP033M-5](#) [BKN13SP025L-5](#) [BKN10SP003M-5](#) [BKN15SP047L-5](#) [BKN15SP008L-5](#)  
[BKN13SP006L-5](#) [BKN10SP1R5M-5](#) [BKN08SP004M-5](#) [BKN13SP1R3L-5](#) [BKN20SP120M-5](#) [BKN10SP010M-5](#)  
[BKN15SP055M-5](#) [BKN10SP016L-5](#) [BKN25SP020L-5](#) [BKN13SP003L-5](#)