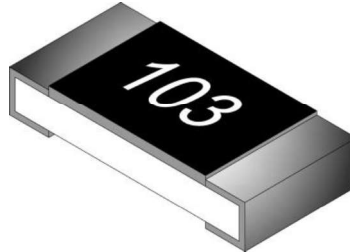




# STH Series Anti Sulfur High Power Chip Resistor Product Specifications

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## ■ Anti-Sulfur High Power Chip Resistor — STH Series



### ■ Application

- Industrial Control, System Sensor, Netcom Station
- Navigation Equipment
- Measuring Instrument
- Telecommunication Equipment, Railway Semaphore System

### ■ Features

- Small Size and Light Weight
- Reliability, High Quality
- Excellent Resistance to Vulcanization (ASTM-B-809-95 & EIA-977 Specification)

## ■ Parts Number Explanation

Example:

| STH          | 0603   | J                               | 10R0  | P  | 05   | Z   |
|--------------|--|---------------------------------|---|--|--|---|
| Product Type | Size (Inch)  | Resistor Tolerance              | Resistor Value  | Package  | Quantity   | Optional  |
| STH          | 0402<br>0603<br>0805<br>1206<br>1210<br>1812<br>2010<br>2512 | D : ±0.5%<br>F : ±1%<br>J : ±5% | 0R=0R00<br>1R=1R00<br>10R=10R0<br>100R=100R<br>1K=1K00<br>1M=1M00 | P : Paper Taping<br>(0603~1210)<br>Q : Paper Taping<br>(0402)<br>E : Embossed Taping | 04 : 4000PCS<br>05 : 5000PCS<br>10 : 10000PCS<br>20 : 20000PCS<br>40 : 40000PCS<br>50 : 50000PCS | Z : 60°C<br>A : 105°C<br>(With AEC-Q200 compatible) |



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## High Power Electrical Specification

| Type    | Item | Rated Power at 70°C | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range |                |        |
|---------|------|---------------------|---------------------|----------------------|-----------------|------------------|----------------|--------|
|         |      | High                |                     |                      |                 | D(±0.5%)         | F(±1%)         | J(±5%) |
| STH0402 |      | 0.1 W               | 50V                 | 100V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH0603 |      | 0.125 W             | 75V                 | 150V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH0805 |      | 0.25 W              | 150V                | 300V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH1206 |      | 0.5 W               | 200V                | 400V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH1210 |      | 0.66 W              | 200V                | 400V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH1812 |      | 1 W                 | 200V                | 400V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH2010 |      | 1 W                 | 200V                | 400V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |
| STH2512 |      | 2w                  | 200V                | 400V                 | ±400            | -                | 1Ω ≤ R < 10Ω   |        |
|         |      |                     |                     |                      | ±100            | 10Ω ≤ R ≤ 1MΩ    | 10Ω ≤ R ≤ 10MΩ |        |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

| Type   | 0402     | 0603 | 0805 | 1206 | 1210 | 1812 | 2010 | 2512 |
|--|----------|------|------|------|------|------|------|------|
| Jumper Resistance Value                      | 20mΩ Max |      |      |      |      |      |      |      |
| Jumper Rated Current                         | 2A       | 2.5A | 3.5A | 5A   | 6A   | 7A   | 7A   | 10A  |
| Max.Over Load Current < 1 second and 1 times | 6A       | 9A   | 13A  | 16A  | 19A  | 22A  | 22A  | 30A  |



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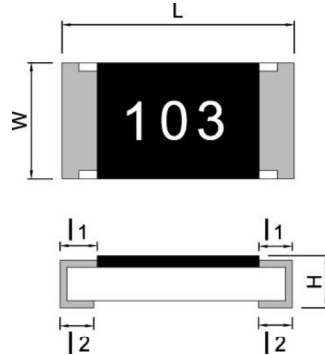
## ● High Ohm Chip Resistor

### ■ Standard Electrical Specifications

| Type    | Item | Rated Power at 70°C | Max Working Voltage | Max Overload Voltage | T.C.R. (PPM/°C) | Resistance Range      |                       |
|---------|------|---------------------|---------------------|----------------------|-----------------|-----------------------|-----------------------|
|         |      |                     |                     |                      |                 | F(±1%)                | J(±5%)                |
| STH0402 |      | 0.1 W               | 50V                 | 100V                 | ±200            | 10.1 MΩ<br>~<br>30 MΩ | 10.1 MΩ<br>~<br>30 MΩ |
| STH0603 |      | 0.125 W             | 75V                 | 150V                 |                 |                       |                       |
| STH0805 |      | 0.25 W              | 150V                | 300V                 |                 |                       |                       |
| STH1206 |      | 0.5 W               | 200V                | 400V                 |                 |                       |                       |
| STH1210 |      | 0.66 W              |                     |                      |                 |                       |                       |
| STH2010 |      | 1 W                 |                     |                      |                 |                       |                       |
| STH2512 |      | 2 W                 |                     |                      |                 |                       |                       |

- For non-standard parts, please contact our sales dept.
- Operating Temperature Range : -55°C ~ +155°C.

### ■ Type Dimension



STH0402 / STH0603 / STH0805 / STH1206 / STH1210 / STH1812 / STH2010 / STH2512

| TYPE    | L           | W           | H           | l <sub>1</sub> | l <sub>2</sub> |
|---------|-------------|-------------|-------------|----------------|----------------|
| STH0402 | 1.00 ± 0.05 | 0.50 ± 0.05 | 0.30 ± 0.05 | 0.15 ± 0.10    | 0.20 ± 0.10    |
| STH0603 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.40 ± 0.10 | 0.30 ± 0.20    | 0.30 ± 0.10    |
| STH0805 | 2.00 ± 0.10 | 1.25 ± 0.10 | 0.50 ± 0.15 | 0.30 ± 0.15    | 0.40 ± 0.15    |
| STH1206 | 3.05 ± 0.10 | 1.60 ± 0.10 | 0.55 ± 0.15 | 0.40 ± 0.20    | 0.50 ± 0.20    |
| STH1210 | 3.05 ± 0.10 | 2.50 ± 0.15 | 0.55 ± 0.15 | 0.50 ± 0.20    | 0.50 ± 0.20    |
| STH1812 | 4.50 ± 0.10 | 3.10 ± 0.15 | 0.55 ± 0.05 | 0.55 ± 0.20    | 0.70 ± 0.20    |
| STH2010 | 5.00 ± 0.20 | 2.50 ± 0.15 | 0.55 ± 0.10 | 0.60 ± 0.20    | 0.60 ± 0.20    |
| STH2512 | 6.30 ± 0.20 | 3.20 ± 0.15 | 0.65 ± 0.15 | 0.60 ± 0.30    | 0.60 ± 0.30    |

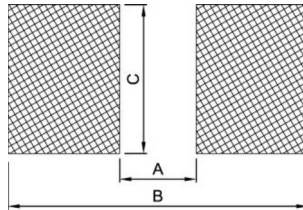


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## ● General Information

### ■ Recommend Land Pattern Design



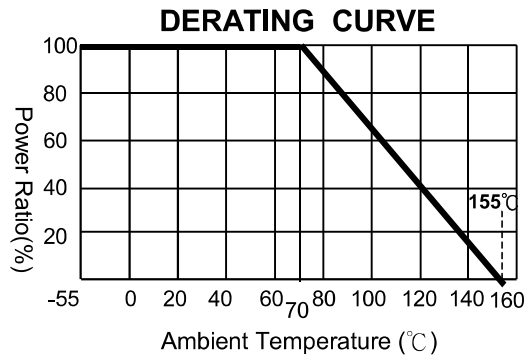
### ■ Dimension

Unit:mm

| Item \ Type | 0402 | 0603 | 0805 | 1206 | 1210 | 1812 | 2010 | 2512 |
|-------------|------|------|------|------|------|------|------|------|
| A           | 0.60 | 0.80 | 1.30 | 2.20 | 2.00 | 3.11 | 3.80 | 4.90 |
| B           | 1.60 | 2.40 | 2.90 | 4.20 | 4.40 | 5.91 | 6.60 | 8.10 |
| C           | 0.70 | 1.00 | 1.40 | 1.70 | 2.70 | 3.00 | 2.70 | 3.40 |

## ■ Performance Characteristics

### ■ Power Derating Curve



Power rating or current rating is in the case based on continuous full-load at ambient temperature of 70°C. For operation at ambient temperature in excess of 70°C, the load should be derated in accordance with figure of derating Curve.

### ■ Voltage Rating or Current Rating

Resistance Range:  $\geq 1\Omega$

Rated Voltage: The resistor shall have a DC continuous working voltage or a RMS AC continuous working voltage at commercial-line frequency and wave form corresponding to the power rating, as determined formula as following:

$$E(RCWV) = \sqrt{P \times R}$$

E=Rated voltage(V)  
P=Power rating(W)  
R=Nominal resistance( $\Omega$ )



## STH Series Anti Sulfur High Power Chip Resistor Product Specifications

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### ● Reliability Test and Requirement

| Test Item                                     | Test Method                               | Procedure  | Requirements   |
|---|---|--|--|
| Temperature Coefficient of Resistance (T.C.R) | JIS-C-5201-1 4.8<br>IEC-60115-1 4.8       | At 25°C / -55°C and 25°C / +155°C, 25°C is the reference temperature   | As Spec  |
| Short Time Overload                           | JIS-C-5201-1 4.13<br>IEC-60115-1 4.13     | High Power : 2.5 times RCWV or Max. Overload voltage whichever is less for 2 seconds.<br>Jumper: Over Load Current for 5 seconds<br>0402/0603/0805=2.5A<br>1206/1210/1812/2010/2512=5A | 1% and below : $\pm(1.0\%+0.05\Omega)$<br>2%、5% : $\pm(2.0\%+0.10\Omega)$<br>Jumper : Max 0.05 $\Omega$ after test   |
| Leaching                                      | JIS-C-5201-1 4.18<br>IEC-60068-2-58 8.2.1 | 260 $\pm$ 5°C for 30 seconds.  | Individual leaching area $\leq$ 5%<br>Total leaching area $\leq$ 10%   |
| Resistance to Soldering Heat                  | JIS-C-5201-1 4.18<br>IEC-60115-1 4.18     | 260 $\pm$ 5°C for 10 seconds.  | 1% and below : $\pm(0.5\%+0.05\Omega)$<br>2%、5% : $\pm(1.0\%+0.05\Omega)$  |
| Rapid Change of Temperature                   | JIS-C-5201-1 4.19<br>IEC-60115-1 4.19     | -55°C to +155°C,5 cycles   | 1% and below : $\pm(0.5\%+0.05\Omega)$<br>2%、5% : $\pm(1.0\%+0.10\Omega)$  |
| Resistance to Solvent                         | JIS-C-5201-1 4.29                         | The tested resistor be immersed into isopropyl alcohol of 20~25°C for 60 secs.<br>Then the resistor is left in the room for 48 hrs.  | 1% and below : $\pm(0.5\%+0.05\Omega)$<br>2%、5% : $\pm(0.5\%+0.05\Omega)$<br>Jumper : Max 0.05 $\Omega$ after test   |
| Damp Heat with Load                           | JIS-C-5201-1 4.24<br>IEC-60115-1 4.24     | 40 $\pm$ 2°C, 90~95% R.H. RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .  | 1% and below : $\pm(1.0\%+0.05\Omega)$<br>2%、5% : $\pm(2.0\%+0.05\Omega)$<br>Value <1 $\Omega$ : $\pm(2.0\%+0.05\Omega)$<br>Jumper : Max 0.1 $\Omega$ after test |
| Load Life (Endurance)                         | JIS-C-5201-1 4.25<br>IEC-60115-1 4.25.1   | 70 $\pm$ 2°C, RCWV or Max. working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF" .  | 1% and below : $\pm(1.0\%+0.05\Omega)$<br>2%、5% : $\pm(3.0\%+0.10\Omega)$<br>Value <1 $\Omega$ : $\pm(3.0\%+0.10\Omega)$<br>Jumper : Max 0.1 $\Omega$ after test |
| Insulation Resistance                         | JIS-C-5201-1 4.6<br>IEC-60115-1 4.6       | Apply 100VDC for 1 minute.   | $\geq$ 10G $\Omega$  |
| Bending Strength                              | JIS-C-5201-1 4.33<br>IEC-60115-1 4.33     | Bending once for 5 seconds<br>D : 0402、0603、0805=5mm<br>1206、1210、1812=3mm<br>2010、2512=2mm  | 1% and below : $\pm(1.0\%+0.05\Omega)$<br>2%、5% : $\pm(1.0\%+0.05\Omega)$  |
| Sulfur Test                                   | ASTM-B-809-95<br>EIA-977                  | 60 $\pm$ 2°C, no rating power for 1000 hrs   | $\Delta$ R : $\pm(1.0\%+0.05\Omega)$   |
|   |   | 105 $\pm$ 2°C, no rating power for 1000 hrs  | $\Delta$ R : $\pm(2.0\%+0.05\Omega)$   |

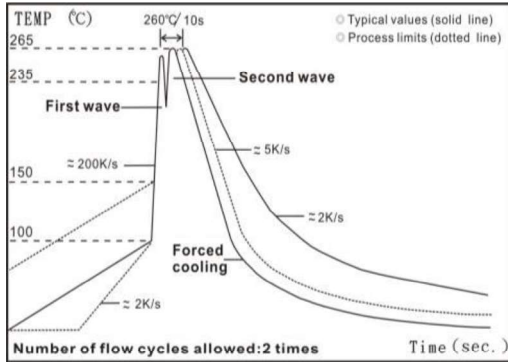


# STH Series Anti Sulfur High Power Chip Resistor Product Specifications

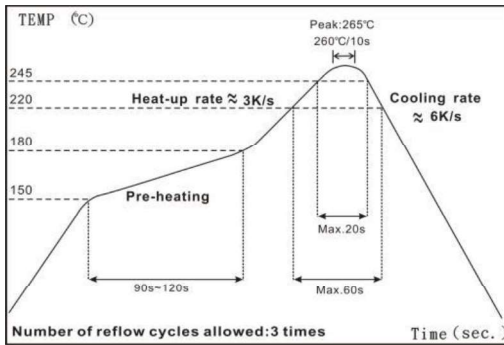
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## Recommended Customer Soldering Parameters

### Wave solder Temperature condition



### Solder reflow Temperature condition



Rework temperature (hot air equipment) : 350°C, 3~5seconds

### Recommended reflow methods

IR, vapor phase oven, hot air oven

If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements

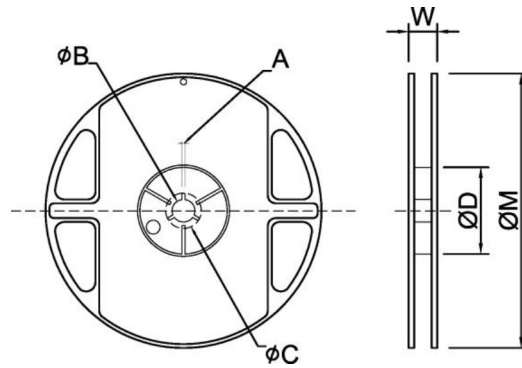


# STH Series Anti Sulfur High Power Chip Resistor Product Specifications

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## ■ Appendix For SMD Chip Resistor

### ● Packaging Information



### ■ Dimension

Unit: mm

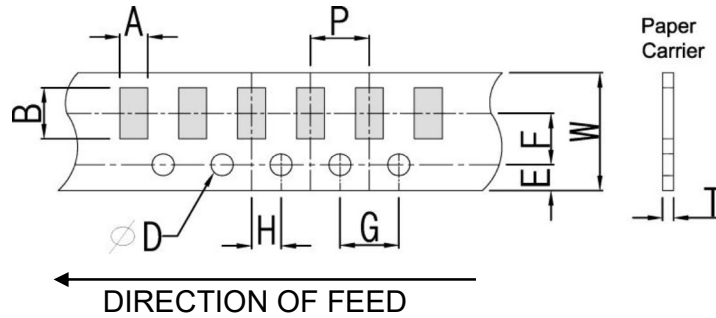
| TYPE                   | SIZE | A            | φB      | φC       | φD     | W       | φM       |         |
|------------------------|------|--------------|---------|----------|--------|---------|----------|---------|
| 0402                   | 7"   | 10K/Reel     | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0  | 11.5±2.0 | 178±2.0 |
| 0402                   | 13"  | 40K/50K Reel | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 330±2.0 |
| 0603/0805<br>1206/1210 | 7"   | 5K/Reel      | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0  | 11.5±2.0 | 178±2.0 |
| 0603/0805<br>/1206     | 10"  | 10K/Reel     | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 254±2.0 |
|                        | 13"  | 20K/Reel     | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 100±1.0 | 11.5±2.0 | 330±2.0 |
| 1812<br>2010/2512      | 7"   | 4K/Reel      | 2.0±0.5 | 13.5±1.0 | 21±1.0 | 60±1.0  | 16.0±2.0 | 178±2.0 |



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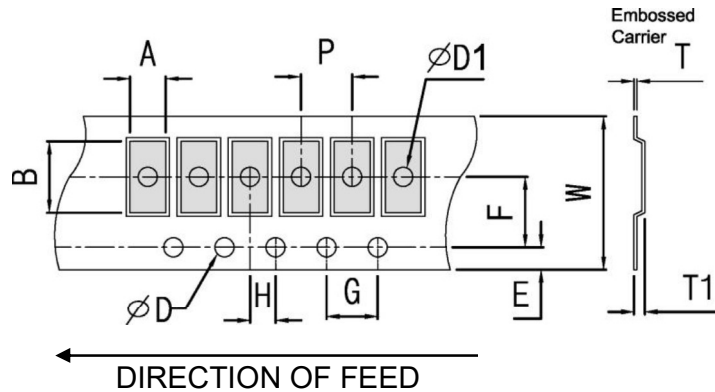
## ■ Tapping Specification



## ■ Dimension

Unit: mm

| Packaging  | Type | A        | B        | W       | E        | F        | G       | H        | T        | $\phi D$            | P       |
|------------|------|----------|----------|---------|----------|----------|---------|----------|----------|---------------------|---------|
| Paper Type | 0402 | 0.70±0.1 | 1.20±0.1 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.45±0.1 | 1.50<br>+0.10<br>-0 | 2.0±0.1 |
|            | 0603 | 1.05±0.2 | 1.80±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.60±0.1 |                     | 4.0±0.1 |
|            | 0805 | 1.55±0.2 | 2.30±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 |                     |         |
|            | 1206 | 1.90±0.2 | 3.50±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 |                     |         |
|            | 1210 | 2.85±0.2 | 3.50±0.2 | 8.0±0.2 | 1.75±0.1 | 3.5±0.05 | 4.0±0.1 | 2.0±0.05 | 0.75±0.1 |                     |         |



## ■ Dimension

Unit: mm

| Packaging     | Type | A         | B         | W       | E         | F        | G        | H        | T         | $\phi D$            | $\psi D1$ | T1        | P       |
|---------------|------|-----------|-----------|---------|-----------|----------|----------|----------|-----------|---------------------|-----------|-----------|---------|
| Embossed Type | 2010 | 2.80±0.20 | 5.60±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 | 1.50<br>+0.10<br>-0 | 1.50±0.10 | 0.85±0.15 | 4.0±0.1 |
|               | 2512 | 3.40±0.20 | 6.70±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 |                     | 1.50±0.10 | 0.95±0.15 |         |
|               | 1812 | 3.30±0.20 | 4.60±0.20 | 12±0.10 | 1.75±0.10 | 5.5±0.05 | 4.0±0.10 | 2.0±0.05 | 0.23±0.10 |                     | 1.50±0.10 | 0.85±0.15 |         |



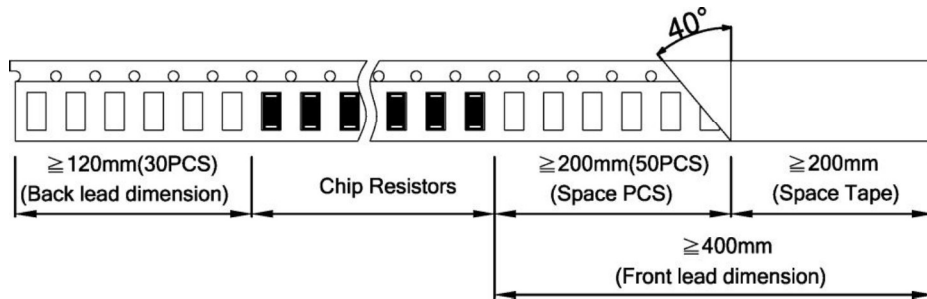


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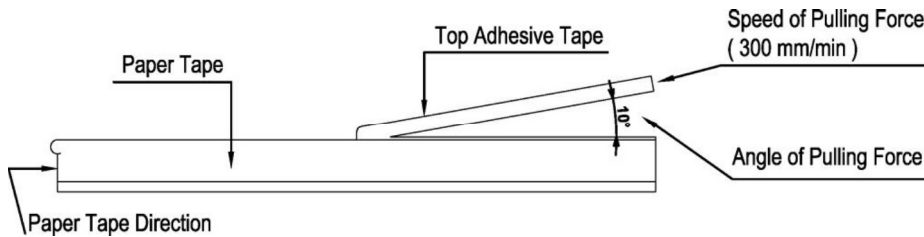
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## ■ Packing Material Data/Storage Data

### ■ Front & Back Lead Dimension

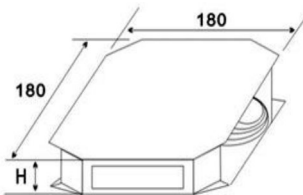


### ■ Top Adhesive Peel Off Strength : 10~70g

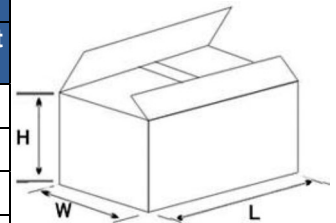


### ■ Package

| Inner Box Size |            |
|----------------|------------|
| Reel           | Size H(mm) |
| 1              | 13         |
| 2              | 24         |
| 3              | 36         |
| 5              | 60         |
| 10             | 113        |



| External Box Size |             |            |             |
|-------------------|-------------|------------|-------------|
| Contain (Kpcs)    | Length (mm) | Width (mm) | Height (mm) |
| 25K               | 180         | 180        | 60          |
| 50K               | 180         | 180        | 110         |
| 150K              | 430         | 200        | 200         |
| 300K              | 400         | 400        | 200         |



### ■ Storage Data :

Storage time at the environment temp:  $25\pm 5^\circ\text{C}$  & humidity:  $60\pm 20\%$  is valid for one year from the date of delivery.



# STH Series Anti Sulfur High Power Chip Resistor Product Specifications

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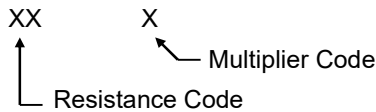
## Product Testing Method:

Our products are tested with our company's tapping & testing equipments by using four-foot probe to touch at the back of both electrodes. Supposed different testing points or methods are requested, please advise beforehand and customized-made production is available.

## 0603 E-96 Multiplier Code

| Code       | A               | B               | C               | D               | E               | F               | G               | H               | X                | Y                | Z                |
|------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|------------------|------------------|------------------|
| Multiplier | 10 <sup>0</sup> | 10 <sup>1</sup> | 10 <sup>2</sup> | 10 <sup>3</sup> | 10 <sup>4</sup> | 10 <sup>5</sup> | 10 <sup>6</sup> | 10 <sup>7</sup> | 10 <sup>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

CODING FORMULA



Example:  $10.2\text{K}\Omega = 102 \times 10^2\Omega = 02\text{C}$

$33.2\Omega = 332 \times 10^{-1}\Omega = 51\text{X}$

## 0603 Standard E-96 Values and 0603 Resistance Codes

|         |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |     |
|---------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| R-Value | 100 | 102 | 105 | 107 | 110 | 113 | 115 | 118 | 121 | 124 | 127 | 130 | 133 | 137 | 140 | 143 | 147 | 150 | 154 | 158 | 162 | 165 | 169 | 174 |
| Code    | 01  | 02  | 03  | 04  | 05  | 06  | 07  | 08  | 09  | 10  | 11  | 12  | 13  | 14  | 15  | 16  | 17  | 18  | 19  | 20  | 21  | 22  | 23  | 24  |
| R-Value | 178 | 182 | 187 | 191 | 196 | 200 | 205 | 210 | 215 | 221 | 226 | 232 | 237 | 243 | 249 | 255 | 261 | 267 | 274 | 280 | 287 | 294 | 301 | 309 |
| Code    | 25  | 26  | 27  | 28  | 29  | 30  | 31  | 32  | 33  | 34  | 35  | 36  | 37  | 38  | 39  | 40  | 41  | 42  | 43  | 44  | 45  | 46  | 47  | 48  |
| R-Value | 316 | 324 | 332 | 340 | 348 | 357 | 365 | 374 | 383 | 392 | 402 | 412 | 422 | 432 | 442 | 453 | 464 | 475 | 487 | 499 | 511 | 523 | 536 | 549 |
| Code    | 49  | 50  | 51  | 52  | 53  | 54  | 55  | 56  | 57  | 58  | 59  | 60  | 61  | 62  | 63  | 64  | 65  | 66  | 67  | 68  | 69  | 70  | 71  | 72  |
| R-Value | 562 | 576 | 590 | 604 | 619 | 634 | 649 | 665 | 681 | 698 | 715 | 732 | 750 | 768 | 787 | 806 | 825 | 845 | 866 | 887 | 909 | 931 | 953 | 976 |
| Code    | 73  | 74  | 75  | 76  | 77  | 78  | 79  | 80  | 81  | 82  | 83  | 84  | 85  | 86  | 87  | 88  | 89  | 90  | 91  | 92  | 93  | 94  | 95  | 96  |



# STH Series Anti Sulfur High Power Chip Resistor Product Specifications

|               |               |
|---------------|---------------|
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## Standard Resistance Values in a Decade

Marking code:

- 1%: marking code, please refer to E96 and E24 data form as below  
 Ex: 120K, The marking code is 1203 in E24  
 121K, The marking code is 1213 in E96
- 5%: marking code, please refer to E24 data form as below  
 Ex: 120K, The marking code is 124 in E24
- Note: 0402 series resistor has no marking code.
- Type: 0603 1% marking code, please refer to E-96 multiplier code.
- Note: jumper zero ohm resistor marking code is one 「0」 (except type below 0402).

| E96 | E48 | E96 | E48 | E96 | E48 | E96 | E48 | E96        | E48        |           |           |  |  |
|-----|-----|-----|-----|-----|-----|-----|-----|------------|------------|-----------|-----------|--|--|
| 100 | 100 | 169 | 169 | 287 | 287 | 487 | 487 | 825        | 825        |           |           |  |  |
| 102 |     | 174 |     | 294 |     | 499 |     | 845        |            |           |           |  |  |
| 105 | 105 | 178 | 178 | 301 | 301 | 511 | 511 | 866        | 866        |           |           |  |  |
| 107 |     | 182 |     | 309 |     | 523 |     | 887        |            |           |           |  |  |
| 110 | 110 | 187 | 187 | 316 | 316 | 536 | 536 | 909        | 909        |           |           |  |  |
| 113 |     | 191 |     | 324 |     | 549 |     | 931        |            |           |           |  |  |
| 115 | 115 | 196 | 196 | 332 | 332 | 562 | 562 | 953        | 953        |           |           |  |  |
| 118 |     | 200 |     | 340 |     | 576 |     | 976        |            |           |           |  |  |
| 121 | 121 | 205 | 205 | 348 | 348 | 590 | 590 |            |            |           |           |  |  |
| 124 |     | 210 |     | 357 |     | 604 |     | <b>E24</b> | <b>E12</b> | <b>E6</b> | <b>E3</b> |  |  |
| 127 | 127 | 215 | 215 | 365 | 365 | 619 | 619 | 10         | 10         | 10        | 10        |  |  |
| 130 |     | 221 |     | 374 |     | 634 |     | 11         |            |           |           |  |  |
| 133 | 133 | 226 | 226 | 383 | 383 | 649 | 649 | 12         | 12         |           |           |  |  |
| 137 |     | 232 |     | 392 |     | 665 |     | 13         |            |           |           |  |  |
| 140 | 140 | 237 | 237 | 402 | 402 | 681 | 681 | 15         | 15         | 15        |           |  |  |
| 143 |     | 243 |     | 412 |     | 698 |     | 16         |            |           |           |  |  |
| 147 | 147 | 249 | 249 | 422 | 422 | 715 | 715 | 18         | 18         |           |           |  |  |
| 150 |     | 255 |     | 432 |     | 732 |     | 20         |            |           |           |  |  |
| 154 | 154 | 261 | 261 | 442 | 442 | 750 | 750 | 22         | 22         | 22        | 22        |  |  |
| 158 |     | 267 |     | 453 |     | 768 |     | 24         |            |           |           |  |  |
| 162 | 162 | 274 | 274 | 464 | 464 | 787 | 787 | 27         | 27         |           |           |  |  |
| 165 |     | 280 |     | 475 |     | 806 |     | 30         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 33         | 33         | 33        |           |  |  |
|     |     |     |     |     |     |     |     | 36         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 39         | 39         |           |           |  |  |
|     |     |     |     |     |     |     |     | 43         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 47         | 47         | 47        | 47        |  |  |
|     |     |     |     |     |     |     |     | 51         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 56         | 56         |           |           |  |  |
|     |     |     |     |     |     |     |     | 62         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 68         | 68         | 68        |           |  |  |
|     |     |     |     |     |     |     |     | 75         |            |           |           |  |  |
|     |     |     |     |     |     |     |     | 82         | 82         |           |           |  |  |
|     |     |     |     |     |     |     |     | 91         |            |           |           |  |  |

According to IEC publication 63