



## General

- Chip size from 0201 to 2512
- Resistance value from 1Ω to 3MΩ
- High accuracy
- High Anti-Corrosion performance
- Low TCR
- Lead free, ROHS compliant for global
- Applications and halogen free

## Application

- Medical Equipment.
- Test/Measurement Equipment
- Printer Equipment
- Automatic Equipment
- Communication Device、 Mobile phone etc

## Electrical Specifications

Type	Power Rating at 70°C (W)	Limiting Element Voltage (V)	Max Overload Voltage (V)	Resistance Range						TCR (ppm/°C)
				± 0.01%	± 0.05%	±0.1%	± 0.25%	±0.5%	±1%	
0201	1/32W	15V	30V	---			49.9Ω~4.99KΩ			±25
				---			49.9Ω~33KΩ			±50
0402	1/16W	50V	100V	49.9Ω~4.99KΩ			---			±2、±3
				24.9Ω~20KΩ						±5
				4.7Ω~30KΩ						±10 ±15
				---	4.7Ω~100KΩ				±25 ±50	
	1/10W	50V	100V	49.9Ω~4.99KΩ			---			±2、±3
				49.9Ω~10KΩ						±5
				49.9Ω~12KΩ		49.9Ω~60KΩ				±10
				49.9Ω~12KΩ		49.9Ω~69.8KΩ				±15
---	49.9Ω~12KΩ	10Ω~255KΩ	4.7Ω~255KΩ			±25、±50				

Type	Power Rating at 70°C (W)	Limiting Element Voltage (V)	Max Overload Voltage (V)	Resistance Range						TCR (ppm/°C)
				± 0.01%	± 0.05%	± 0.1%	± 0.25%	± 0.5%	± 1%	
0603	1/16W	50V	100V	24.9Ω~15KΩ			---			±2、±3
				24.9Ω~60KΩ						±5
				24.9Ω~100KΩ	4.7Ω~332KΩ	4.7Ω~511KΩ				±10 ±15
				---	4.7Ω~332KΩ	4.7Ω~1MΩ	1Ω~1MΩ			±25 ±50
	1/10W	75V	150V	24.9Ω~15KΩ			---			±2、±3
				24.9Ω~15KΩ						±5
				24.9Ω~100KΩ	4.7Ω~332KΩ	4.7Ω~332KΩ				±10、±15
	1/8W 1/6W	100V	150V	---	10Ω~332KΩ					±25、±50
				1Ω~1MΩ						±25、±50
				1Ω~1MΩ						±25、±50
0805	1/10W	100V	200V	24.9Ω~30KΩ			---			±2、±3
				24.9Ω~150KΩ						±5
				4.7Ω~1MΩ						±10 ±15
				---	4.7Ω~1MΩ	4.7Ω~2MΩ	1Ω~2MΩ			±25 ±50
	1/8W	150V	300V	24.9Ω~30KΩ			---			±2、±3
				---			24.9Ω~49.9KΩ			±5
				24.9Ω~200KΩ	4.7Ω~511KΩ	4.7Ω~511KΩ				±10
						4.7Ω~1MΩ				±15
						4.7Ω~1MΩ	1Ω~1MΩ			±25、±50
	1/4W	150V	300V	---	10Ω~499KΩ					±25、±50
1206	1/8W	150V	300V	24.9Ω~49.9KΩ			---			±2、±3
				24.9Ω~300KΩ						±5
				24.9Ω~499KΩ	4.7Ω~1MΩ					±10 ±15
				---	4.7Ω~1MΩ	4.7Ω~2.49MΩ	1Ω~2.49MΩ			±25 ±50

Type	Power Rating at 70°C (W)	Limiting Element Voltage (V)	Max Overload Voltage (V)	Resistance Range						TCR (ppm/°C)
				± 0.01%	± 0.05%	± 0.1%	± 0.25%	± 0.5%	± 1%	
1206	1/4W	200V	400V	24.9Ω~49.9KΩ			---			±2、±3
				24.9Ω~100KΩ						±5
	24.9Ω~499KΩ		4.7Ω~1MΩ				±10、±15 ±25、±50			
	1/3W	200V	400V	---			10Ω~1MΩ			±25、±50
1210	1/4W	150V	300V	24.9Ω~49.9KΩ			---			±2、±3
				24.9Ω~300KΩ						±5
				24.9Ω~499KΩ		4.7Ω~1MΩ				±10 ±15
				---		4.7Ω~1MΩ	4.7Ω~2.49MΩ	1Ω~2.49MΩ		
	1/3W	200V	400V	24.9Ω~49.9KΩ			---			±2、±3
				24.9Ω~10KΩ						±5
24.9Ω~499KΩ		4.7Ω~1MΩ				±10、±15 ±25、±50				
2010	1/4W	150V	300V	24.9Ω~100KΩ			---			±2、±3
				24.9Ω~300KΩ						±5
				24.9Ω~499KΩ		4.7Ω~1MΩ				±10 ±15
				---		4.7Ω~1MΩ	4.7Ω~3MΩ	1Ω~3MΩ		
	1/3W	200V	400V	24.9Ω~49.9KΩ			---			±2、±3
				24.9Ω~100KΩ						±5
				24.9Ω~499KΩ		4.7Ω~1MΩ				±10、±15 ±25、±50
				1/2W		200V	200V	---		
---		4.7Ω~1MΩ			1Ω~1MΩ			±25、±50		
2512	1/2W	150V	300V	24.9Ω~100KΩ			---			±2、±3
				24.9Ω~300KΩ						±5
				24.9Ω~499KΩ		4.7Ω~1MΩ				±10 ±15
				---		4.7Ω~1MΩ	4.7Ω~3MΩ	1Ω~3MΩ		

Type	Power Rating at 70°C (W)	Limiting Element Voltage (V)	Max Overload Voltage (V)	Resistance Range						TCR (ppm/°C)
				± 0.01%	± 0.05%	± 0.1%	± 0.25%	± 0.5%	± 1%	
2512	3/4W	200V	400V	24.9Ω	4.7Ω~470KΩ		1Ω~470KΩ			±10、±15
				~2KΩ	4.7Ω~1MΩ		1Ω~1MΩ			±25、±50
2512	1W	200V	400V	---		4.7Ω ~1MΩ	1Ω~1MΩ			±25、±50

Remark:

a. Rated Voltage= Power Rating Resistance Value or Limiting element voltage whichever is lower.

b. Operating temp. Range -55~155°C

### Part Number Information

STH 25 D A F 10R0 I

**【1】 【2】 【3】 【4】 【5】 【6】 【7】**

**【1】** Series Name: SART Thin Film Type

**【2】** Chip size: 25:2512 20:2010 13:1210 12:1206 08:0805 06:0603 04:0402 02:0201

**【3】** TCR Code: D:±5ppm/°C E:±10ppm/°C F:±15ppm/°C G:±25ppm/°C H:±50ppm/°C

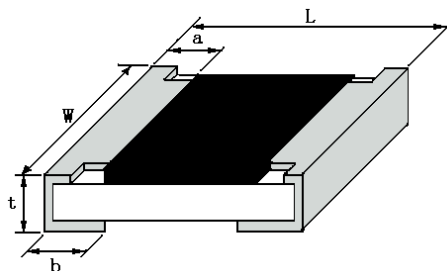
**【4】** Power Code: A:1/32W C:1/16W D:1/10W E:1/8W F:1/4W G:1/2W R:1/3W H:3/4W 1:1W

**【5】** Resistance Tolerance: T: ±0.01% A: ±0.05% B: ±0.1% C: ±0.25% D: ±0.5% F: ±1%

**【6】** Resistance Code: 10R0:10Ω 1000:100Ω 4701:4.70KΩ

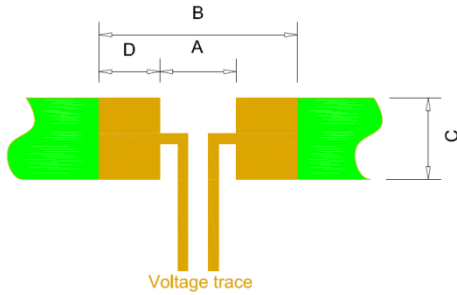
**【7】** Packaging Code: T:Tape& Reel B: Bulk Pack

### Dimensions



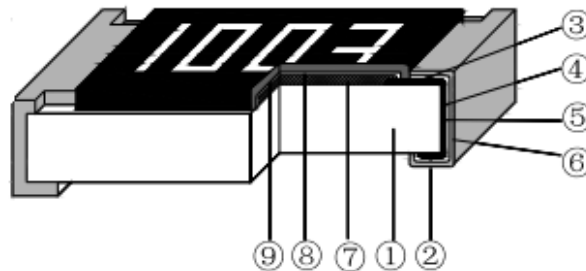
Type	L(mm)	W(mm)	T(mm)	A(mm)	B(mm)
0201	0.60±0.05	0.30±0.05	0.23±0.05	0.10±0.05	0.15±0.05
0402	1.00±0.10	0.50±0.10	0.30±0.10	0.20±0.10	0.25±0.10
0603	1.60±0.15	0.80±0.15	0.40±0.10	0.30±0.20	0.30±0.20
0805	2.00±0.20	1.25±0.15	0.50±0.10	0.30±0.20	0.40±0.20
1206	3.20±0.20	1.60±0.15	0.55±0.10	0.40±0.20	0.50±0.20
1210	3.20±0.20	2.50±0.20	0.55±0.10	0.40±0.20	0.50±0.20
2010	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
2512	6.40±0.20	3.20±0.20	0.55±0.10	0.60±0.20	0.60±0.20

## Recommended Land Patterns



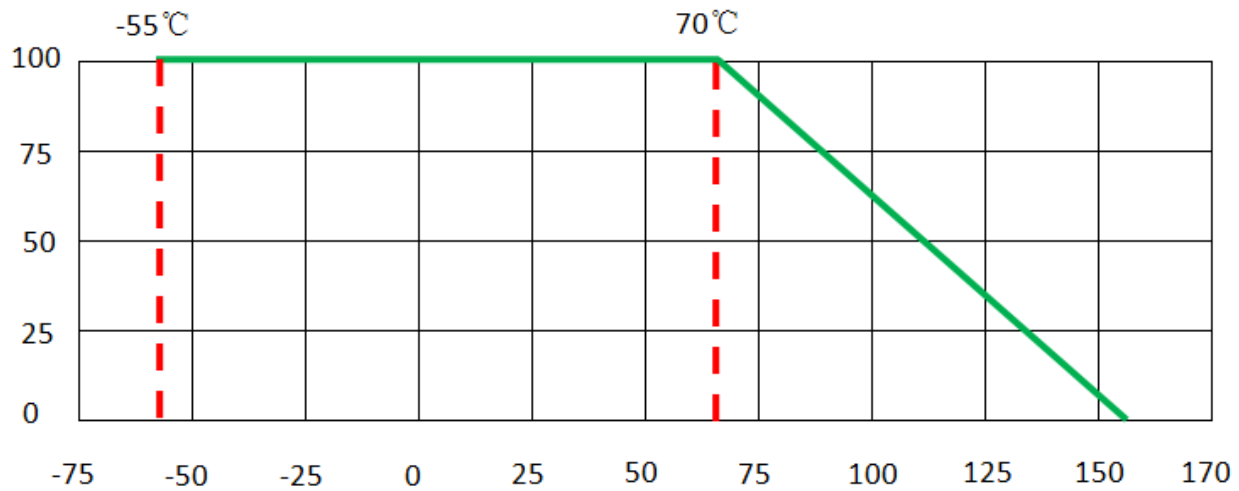
Type	A(mm)	B(mm)	C(mm)	D(mm)
0201	0.23	0.84	0.38	0.31
0402	0.45	1.45	0.60	0.50
0603	0.80	2.50	0.95	0.85
0805	1.05	3.25	1.40	1.05
1206	1.90	4.50	1.75	1.30
1210	2.00	4.60	2.70	1.30
2010	3.50	6.50	2.70	1.50
2512	4.80	7.80	3.40	1.50

## Materials



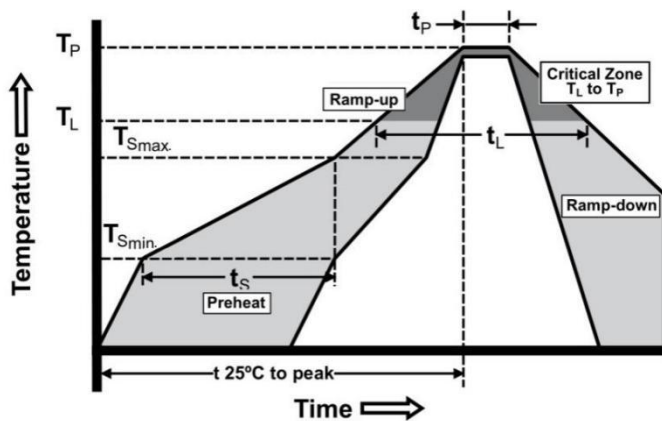
No.	Materials	No.	Materials
1	Alumina Substrate	6	External Electrode
2	Bottom Electrode	7	Resistor Layer
3	Top Electrode	8	Passivation
4	Edge Electrode	9	Protective Coating
5	Barrier Layer	10	/

### Power Derating Curve



### Recommended Solder Curve

- Infrared Reflow  
Temperature: 260°C  
Time: 5sec Max.  
Recommend Reflow profile:



Profile Feature	Pb-Free Assembly
Average Ramp-Up Rate (T <sub>Smax</sub> to T <sub>P</sub> )	3°C/sec Max.
Preheat	150°C
Temperature Min(T <sub>Smin</sub> )	200°C
Temperature Max(T <sub>Smax</sub> )	60sec~120sec
Time(T <sub>Smin</sub> to T <sub>Smax</sub> )	260°C
Peak Temperature(T <sub>P</sub> )	5sec
Time within 5°C of actual Peak Temperature(T <sub>P</sub> )	20sec~30sec
Melting tin time(T <sub>L</sub> )	6°C/sec Max.
Ramp-Down Rate	8min Max.
Time 25°C to Peak Temperature	

- Wave soldering  
Reservoir Temperature: 260°C  
Time in Reservoir: 10sec Max.

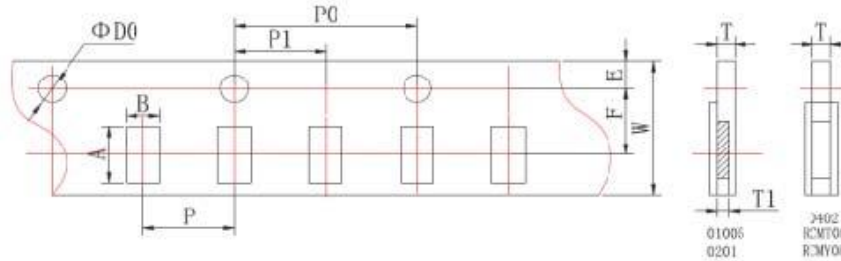
- Hand Soldering  
Temperature: 350°C  
Time: 5sec Max.

### Product Characteristics

Item	Test Condition/ Methods	Performance	Standard
Short Time Overload	2.5X rated power for 5sec	$ \Delta R  \leq \pm(0.5\% + 0.05\Omega)$	IEC60115-1 4.13
Temperature Coefficient of Resistance (T.C.R.)	$TCR = \frac{R - R_0}{R_0} \frac{T_2 - T_1}{T_1} \times 10^6$ Test temperature: 25°C~125°C	Refer to SART Spec	IEC60115-1 4.8
Load Life	70°C ± 2°C, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	$ \Delta R  \leq \pm(0.5\% + 0.05\Omega)$	IEC60115-1 4.25
Voltage proof	Apply max. overload voltage of AC RMS at a rate of approximately 100V/sec between substrate and terminations for 60sec ± 5sec	No breakdown or flash-over	IEC60115-1 4.7
Bias Humidity	40°C ± 2°C, (93% ± 3%)RH, 1000 hours, at rated power 1.5 hours "ON", 0.5 hours "OFF"	$ \Delta R  \leq \pm(0.5\% + 0.05\Omega)$	IEC60115-1 4.24
Thermal Shock	-55°C(30min)/+155°C(30min), 100 cycles	$ \Delta R  \leq \pm(0.25\% + 0.05\Omega)$	IEC60115-1 4.19
Solder-ability	245°C ± 5°C, 3.0sec ± 0.3sec	95%coverage Min.	IEC60115-1 4.17
Resistance to Soldering Heat	270°C ± 5°C, 10sec ± 1sec	$ \Delta R  \leq \pm(0.1\% + 0.05\Omega)$	IEC60115-1 4.18
Endurance at Upper Category Temperature	Resistor should be exposed at 155°C ± 2°C for 96 hours	$ \Delta R  \leq \pm(0.2\% + 0.05\Omega)$	IEC 60115-1 4.25.3
Bending Test	Epoxy thickness 1.6mm, fulcrums distance 90mm, bending width 5mm(0201\0402\0603\0805), bending width 4mm(1206\1210), bending width 2mm(2010\2512)	$ \Delta R  \leq \pm(0.1\% + 0.05\Omega)$	IEC60115-1 4.33
Insulation Resistance	(100V ± 15V) DC	1000MΩ Min.	IEC 60115-1 4.6
Operation at low temperature	-55°C ± 5°C, 1hour without load, rated voltage or limiting element voltage whichever is lower for 45 min, 15min without load	$ \Delta R  \leq \pm(0.5\% + 0.05\Omega)$	IEC60115-1 4.25.3

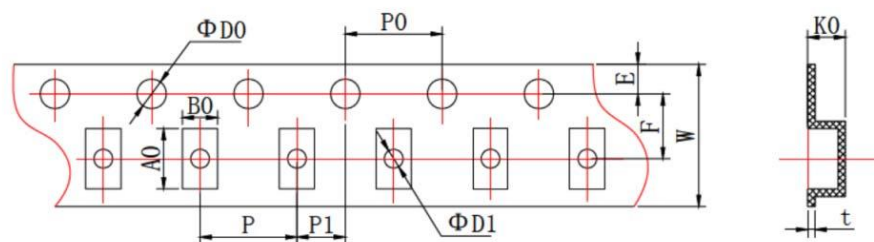
### Packaging

#### 1. Paper Tape Dimensions



Type	A(mm)	B(mm)	W(mm)	F(mm)	E(mm)
0201	0.70±0.10	0.40±0.10	8.00±0.20	3.50±0.05	1.75±0.10
0402	1.20±0.10	0.70±0.10	8.00±0.20	3.50±0.05	1.75±0.10
0603	1.85±0.10	1.10±0.10	8.00±0.20	3.50±0.05	1.75±0.10
0805	2.35±0.10	1.65±0.10	8.00±0.20	3.50±0.05	1.75±0.10
1206	3.50±0.20	1.90±0.20	8.00±0.20	3.50±0.05	1.75±0.10
1210	3.50±0.20	2.80±0.20	8.00±0.20	3.50±0.05	1.75±0.10
Type	P (mm)	P0(mm)	P1(mm)	D0(mm)	T(mm)
0201	2.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	0.42±0.05
0402	2.00±0.05	4.00±0.10	2.00±0.05	1.50±0.10	0.42±0.05
0603	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.60±0.10
0805	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10
1206	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10
1210	4.00±0.10	4.00±0.10	2.00±0.05	1.50±0.10	0.75±0.10

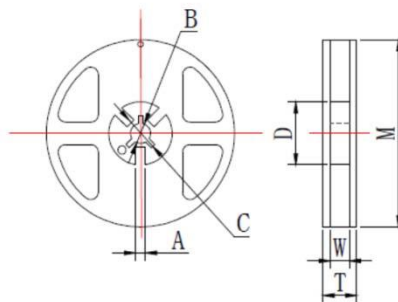
#### 2. Embossed Tape Dimensions





Type	A0(mm)	B0(mm)	W(mm)	F(mm)	E(mm)	t(mm)
2010	5.50±0.15	2.80±0.15	12.00±0.10	5.50±0.10	1.75±0.10	0.24±0.05
2512	6.75±0.15	3.45±0.15	12.00±0.10	5.50±0.10	1.75±0.10	0.25±0.05
Type	P(mm)	P0(mm)	P1(mm)	D0(mm)	D1(mm)	K0(mm)
2010	4.00±0.10	4.00±0.10	2.00±0.05	1.50 <sup>+0.10</sup> <sub>0</sub>	1.50±0.10	0.85±0.05
2512	4.00±0.10	4.00±0.10	2.00±0.05	1.50 <sup>+0.10</sup> <sub>0</sub>	1.50±0.10	1.00±0.10

### 3.Reel Dimensions

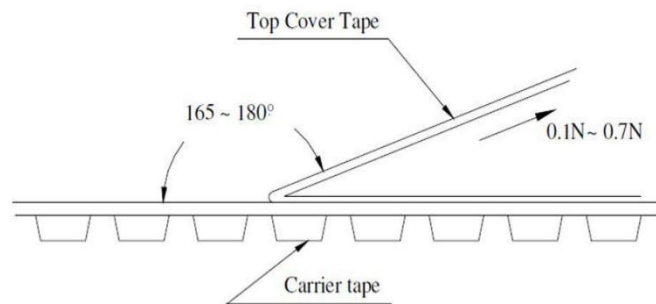


Type	M(mm)	W(mm)	T(mm)	A(mm)	B(mm)	C(mm)	D(mm)
0201 0402 0603 0805 1206 1210	178.00±2.00	9.50±1.00	12.50±1.50	2.00±0.50	13.00±0.50	21.00±0.50	58.00±0.20
2010 2512	178.00±2.00	13.00±0.50	15.50±1.50	2.00±0.50	13.00±0.50	21.00±0.50	57.00±2.00

### 4. Quantity of Package

Type	0201	0402	0603	0805	1206	1210	2010	2512
Quantity (pcs)	10000		5000				4000	

## 5. Peeling Test



## Storage

- The ambient temperature shall be between 5°C~30°C.
- The relative humidity recommended for storage is between 25%RH~60%RH.
- Sealed plastic bags with desiccant shall be used to reduce the oxidation of the termination and shall only be opened prior to use.
- The products shall not be stored in areas where harmful gases containing sulfur or chlorine are present.