Towards Excellence in *Quality, Service & Innovation*

ASJ

DATA SHEET

Anti-Surge Thick Film Chip Resistor

CPS Series

5% TO 20%, TCR ±200

SIZE: 0402, 0603, 0805, 1206, 2010, and 2512

RoHS Compliant

Product Specification – Nov 16, 2023 V8

1. SCOPE

1.1 This specification is applicable to Lead-free and Halogen-free of RoHS directive for CPS series Anti-Surge thick film chip resistors.

1.2 The product is for general electronic purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CPS	21	-	XXX			-	J	L
Series	Size		Nominal Resistance				Tolerance	Packaging
Anti-Surge Thick Film Chip Resistors	10(0402/1005) 16(0603/1608) 21(0805/2012) 32(1206/3216) 50(2010/5025) 63(2512/6432)		Resistor	3-Digit	E24 10Ω = 100 47Ω = 470		J = ±5% K = ±10% M = ±20%	E = 4000 pcs L = 5000 pcs K = 10000 pcs Y = 20000 pcs N = 50000 pcs

3. RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

Type	Rate Power at 70℃	Max. Working Voltage	Max. Overload Voltage
CPS10 (0402)	$\frac{1}{8}$W	50V	100V
CPS16 (0603)	$\frac{1}{4}$W	75V	150V
CPS21 (0805)	$\frac{1}{3}$W	150V	300V
CPS32 (1206)	$\frac{1}{2}$W	200V	400V
CPS50 (2010)	$\frac{3}{4}$W	200V	400V
CPS63 (2512)	1W	200V	400V

3.2 Power Derating Curve:

Operating Temperature Range：- 55 ~ 155 ℃

For resistors operated in ambient temperatures above 70℃, power rating shall be derated in accordance with figure below。

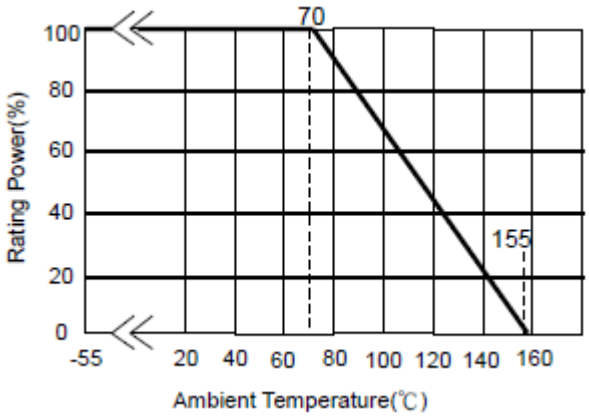


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature = + 5°C to +35°C

Relative Humidity = < 85% RH

Air Pressure = 86 kPa to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits:

Ambient Temperature = 20 ± 2°C

Relative Humidity = 60 to 70% RH

Air Pressure = 86 kPa to 106kPa

3.4 Operating Temperature Range -55°C to +155°C

3.5 Storage Temperature Range -5°C to + 40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance

ASJ resistor shall warranty 24 months from manufacturing date with control conditions.

3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance.

Type	Rate Power at 70℃	Max. Working Voltage	Max. Overload Voltage	T.C.R. (ppm/℃)	Resistance Range		
					J(±5%) E-24	K(±10%) E-24	M(±20%) E-24
CPS10 (0402)	1/8W	50V	100V	±200	1Ω≦R≦1M		
CPS16 (0603)	1/4W	75V	150V	±200	1Ω≦R≦1M		
CPS21 (0805)	1/3W	150V	300V	±200	1Ω≦R≦1M		
CPS32 (1206)	1/2W	200V	400V	±200	1Ω≦R≦1M		
CPS50 (2010)	3/4W	200V	400V	±200	1Ω≦R≦1M		
CPS63 (2512)	1W	200V	400V	±200	1Ω≦R≦1M		
Operating Temperature Range				-55℃ ~ +155℃			

3.11 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 from the following:

$$E = \sqrt{R \times P}$$

E= Rated voltage (v)
P= Power rating (w)
R= Nominal resistance(Ω)

4. MARKING ON PRODUCT

The nominal resistance shall be marked on the surface of each resistor

Part Number	Color	Marking on Product
CPS10 (0402)	-	No marking
CPS16 (0603)	Light Yellow	1) Tolerance; ± 5% (J), ±10% (K), ±20% (M) Three Numerals Marking - CPS16 Mark as a square 2) Zero ohm jumper resistor The marking used shall be 0.
CPS21(0805)	Light Yellow	
CPS32(1206)	Light Yellow	
CPS50(2010)	Light Yellow	
CPS63(2512)	Light Yellow	

4.1 Numeric Numbering

4.1.1 5% Tolerance : ***Three Numerals Marking***

First 2 digits are significant figures, third digit is number of zeros. Letter R is decimal point.

Examples:

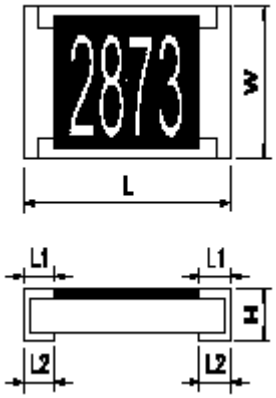
Nominal Resistance	***Marking***	***Remarks***
1 Ω	1R0	$1 \times 10^0 = 1$
10 Ω	100	$10 \times 10^0 = 1\ 0$
100 Ω	101	$10 \times 10^1 = 1\ 00$
4.7K Ω	472	$47 \times 10^2 = 47\ 00$
47K Ω	473	$47 \times 10^3 = 47\ 000$
470K Ω	474	$47 \times 10^4 = 47\ 0000$
4.7M Ω	475	$47 \times 10^5 = 47\ 00000$

E-24 series

10	11	12	13	14	16	18	20	22	24	27	30
33	36	39	43	47	51	56	62	68	75	82	91

5. DIMENSION, CONSTRUCTION AND MATERIAL

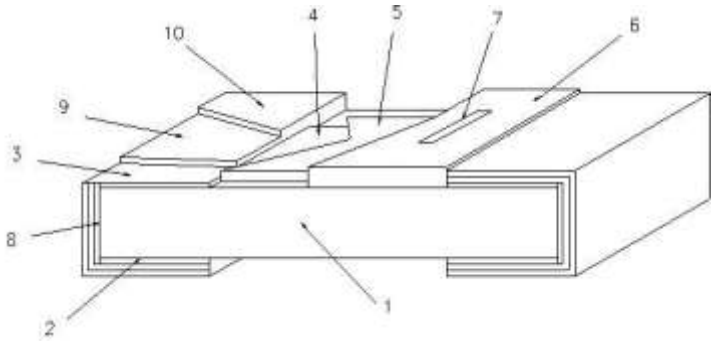
5.1 Dimension



Unit:mm

Type \ Dimension / Size Code		L	W	H	L1	L2
CPS10	**0402**	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
CPS16	**0603**	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
CPS21	**0805**	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.15
CPS32	**1206**	3.05±0.10	1.55±0.10	$0.50^{+0.10}_{-0.05}$	0.45±0.20	0.35±0.15
CPS50	**2010**	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
CPS63	**2512**	6.30±0.20	3.20±0.20	0.55±0.10	0.60±0.20	0.60±0.20

5.2 Structure Graph



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

5.3 Plating Thickness

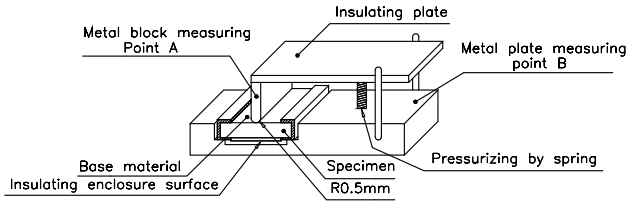
5.3.1 Ni: ≧ 2 μm

5.3.2 Sn (Tin): ≧ 3 μm

5.3.3 Sn (Tin): Matte Sn

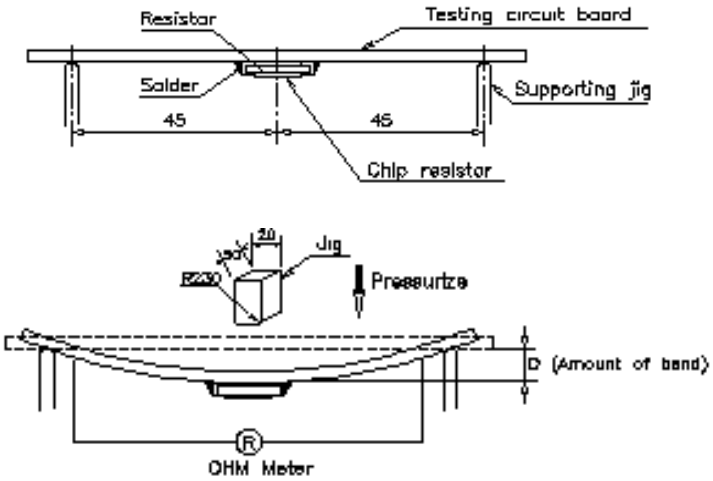
6. RELIABILITY TEST

6.1 Electrical Performance Test

Item	Conditions	Specifications Resistors
Temperature Coefficient of Resistance	***Refer to JIS-C5201-1 4.8*** $TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^{6}$ R1: Resistance at room temperature R2: Resistance at -55℃ or +125℃ T1: Room temperature T2: Temperature -55℃ or +125℃	Refer to item 3.10
Short Time Overload	***Refer to JIS-C5201-1 4.13*** Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3.10 general specifications)	△R%=±0.5%
Insulation Resistance	***Refer to JIS-C5201-1 4.6*** Put the resistor in the fixture, add 100 VDC in + ,- terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material.  	≧10^{9}Ω
Dielectric Withstand Voltage	***Refer to JIS-C5201-1 4.7*** Put the resistor in the fixture, add VAC (see spec. below) in +,- terminal for. CPS10、16 apply 300 VAC 1 minute. CPS21、32、50、63 apply 500 VAC 1 minute.	No short or burned on the appearance.
Intermittent Overload	***Refer to JIS-C5201-1 4.13*** Put the tested resistor in chamber under temperature 25±2℃ and load the rated DC voltage for 1 sec on , 25 sec off , 10000^{+400}_{-0} test cycles, then it be left at no-load for 1 hour , then measure its resistance variance rate.	△R%=±1.0%
ESD	***Refer to AEC-Q200-002*** Put the specimens on the test fixture and apply ±2KVDC on terminals for 1sec .Afterwards, the specimens stabilize for 30min or more and measure of its resistance variance rate.	△R%=±5.0%
Single-pulse high-voltage overload test	***Refer to IEC 60 115-1 4.27*** Test 1: 5 pulses of 1.2/50μs with a period of not less than 12 s. Test 2: 10 pulses of 10/700μs with a period of not less than 1 min.	△R%=±5.0%

6.2 Mechanical Performance Test

Item	Conditions	Specifications Resistors
Terminal Strength	***Refer to JIS-C5201-1 4.16*** Test1:The resistor mounted on the board applied 5Npushingforce on the sample rear for 10 sec. Test2:The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown.	Test1:No evidence of mechanical damage. Test2: ≧5N
Resistance to Solvent	***Refer to JIS-C5201-1 4.29*** The tested resistor be immersed into isopropyl alcohol of 20~25℃for 5 minutes, then the resistor is left in the room for 48 hrs., and measured its resistance variance rate.	△R%=±0.5%
Solderability	***Refer to JIS-C5201-1 4.17*** Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105℃, humidity of 100% RH, and pressure of 1.22×10^5 Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: The resistor be immersed into solder pot in temperature 235±5℃ for 2±0.5 sec, then the resistor is left as placed under microscope to observe its solder area.	Solder coverage over 95%
Resistance to Soldering Heat	***Refer to JIS-C5201-1 4.18*** ◎Test method 1 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 10^{+1}_{-0} seconds. Then the resistor is left in the room for 1 hour. ◎Test method 2 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 30^{+1}_{-0} seconds. Then the resistor is left as placed under microscope to observe its solder area. ◎Test method 3 (Electric iron test): Preheating temperature: 350±10℃ Electric iron preheating time : 3^{+1}_{-0} sec Preheating the electric iron on electrode termination, as after that step placed the iron over 60 min. and measured its resistance variance rate.	Test item 1: (1)Variance rate on resistance △R%=±0.5% Test item 2: (1)Solder coverage over 95%. (2)The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode. Test item 3: (1)Variance rate on resistance △R%=0.5%

Item	Conditions	Specifications
		Resistors
Joint Strength of Solder	***Refer to JIS-C5201-1 4.33*** ◎Test item 2 (Bending Strength): Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate. D:CPS10、16、21=5mm CPS32=3mm CPS50、63=2mm 	△R%=±1.0%

6.3 Environmental Test

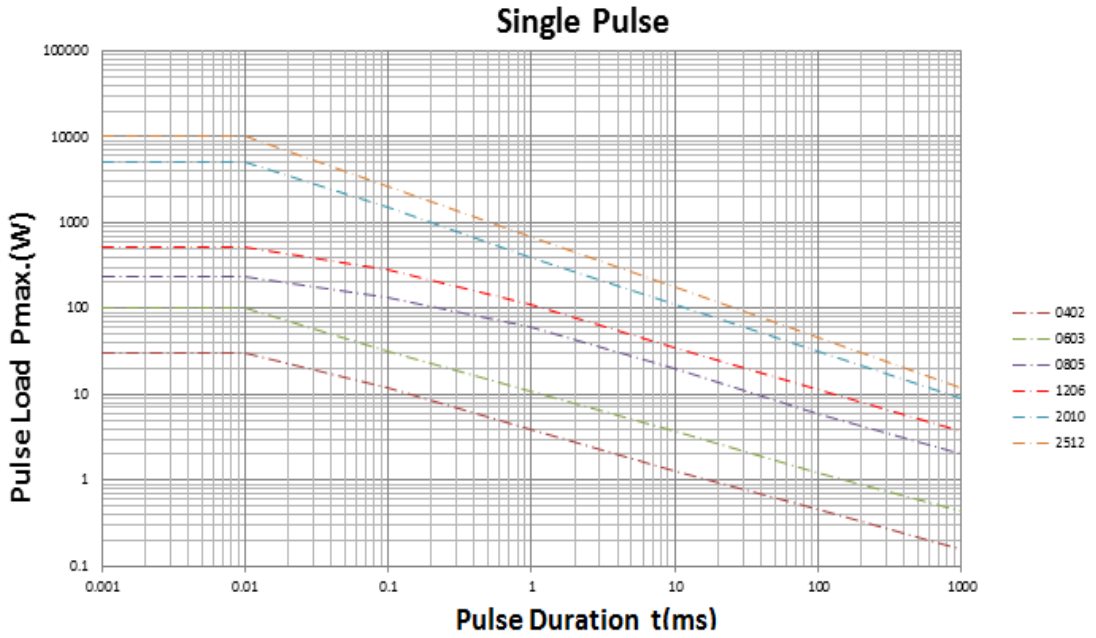
<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th>Specifications</th></tr>
<tr><th>Resistors</th></tr>
<tr><td>Resistance to Dry Heat</td><td>Refer to JIS-C5201-1 4.25
Put tested resistor in chamber under temperature 155±5℃ for 1000^{+48}_{-0} hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
<tr><td>Thermal Shock</td><td>Refer to MIL-STD 202 Method 107
Put the tested resistor in the chamber under the Thermal Shock which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate.
<table><tr><td colspan="2">Testing Condition</td></tr><tr><td>Lowest Temperature</td><td>-55±5℃</td></tr><tr><td>Highest Temperature</td><td>125±5℃</td></tr><tr><td>Temperature-retaining time</td><td>15 minutes each</td></tr></table></td><td>△R%=±1.0%</td></tr>
<tr><td>Loading Life in Moisture</td><td>Refer to JIS-C5201-1 4.24
Put the tested resistor in the chamber under temperature 40±2℃, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
<tr><td>Load Life</td><td>Refer to JIS-C5201-1 4.25
Put the tested resistor in chamber under temperature 70±2℃ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
</table>

6.4 Pulse Loading Capability

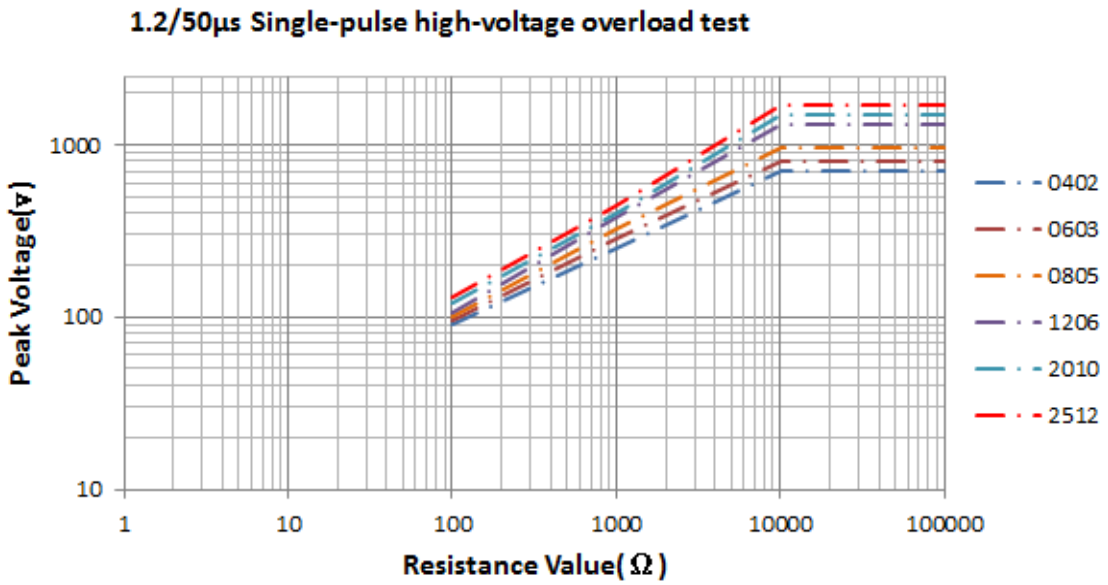
6.4.1 Single Pulse Load:

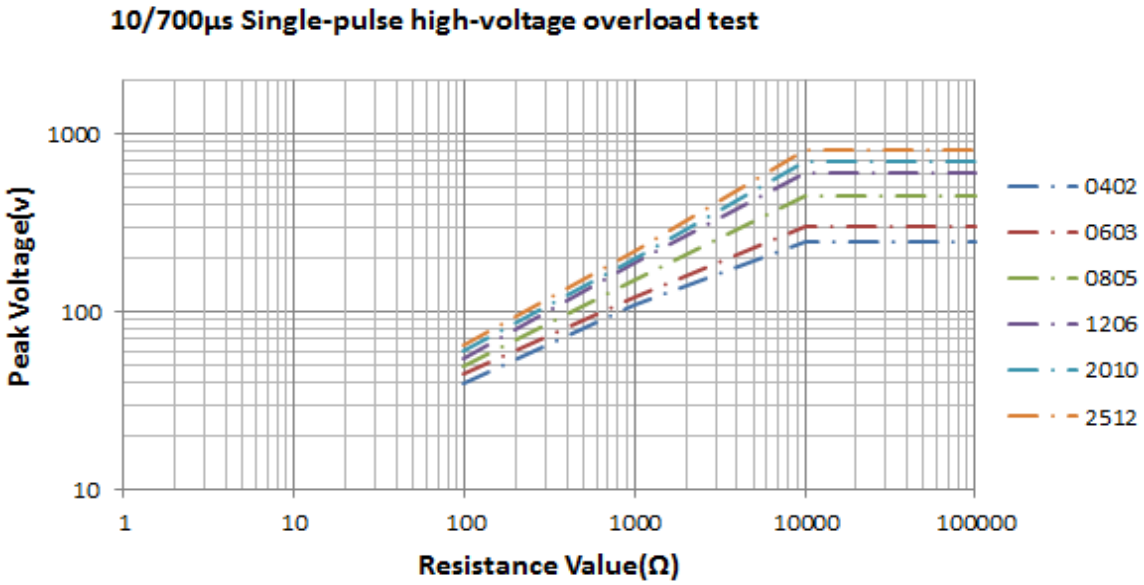
Pulse on a regular basis; maximum permissible peak pulse power (Pmax) as a function of a pulse duration.

V_{peak} ≦CPS10(100V), CPS16(150V), CPS21(300V), CPS32(400V), CPS50(400V), CPS63(400V)



Single pulse high voltage overload test

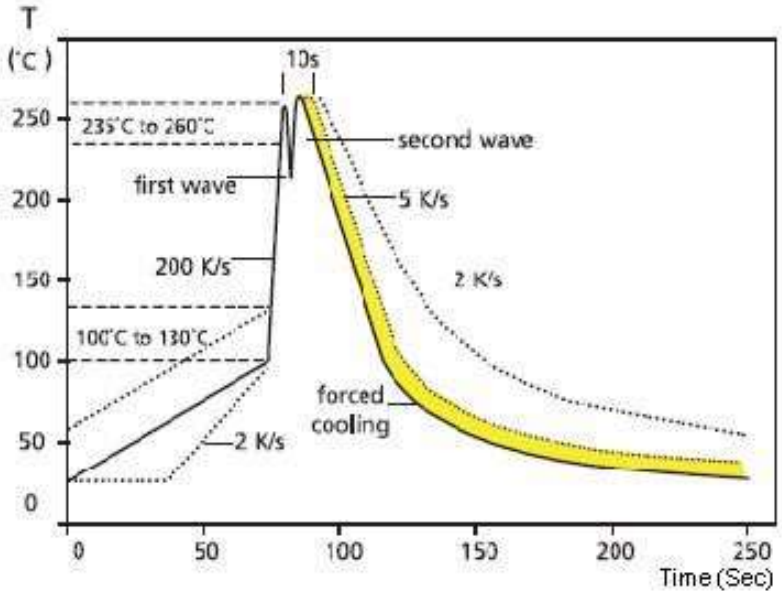



10/700μs Single-pulse high-voltage overload test
Peak Voltage(v)
1000
100
10
1
10
100
1000
10000
100000
Resistance Value(Ω)
0402
0603
0805
1206
2010
2512

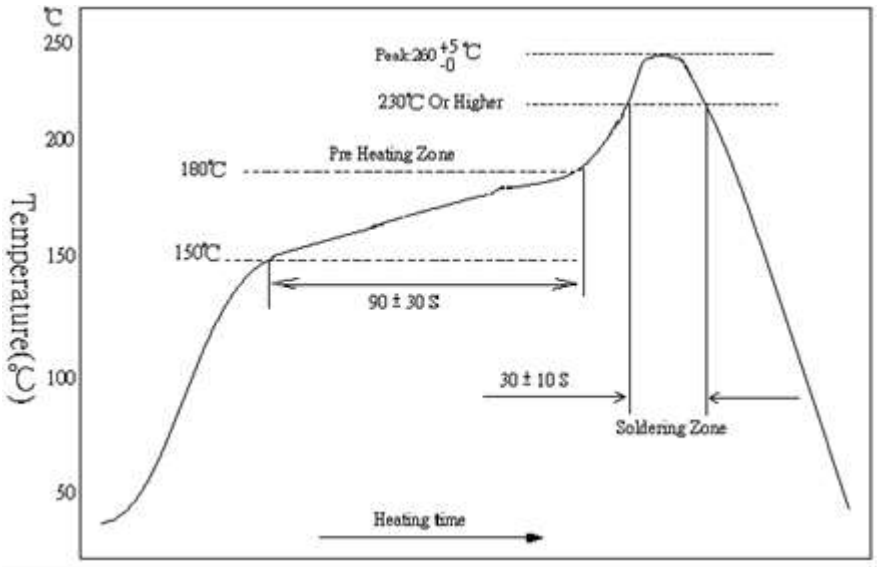
6.5 Soldering Profile

Technical application notes : This is for recommendation, customer please perform adjustment according to the actual application)

6.5.1 Lead-Free Double Wave Soldering Profile (This applies to 0603 size inclusive above products)



6.5.2 Lead-Free IR Reflow Soldering Profile

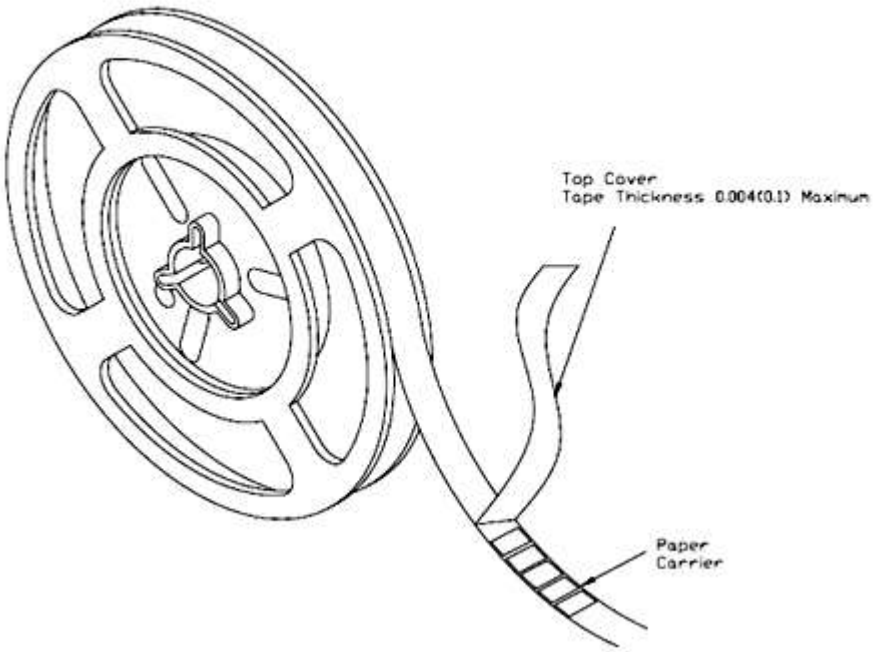


6.5.3 Soldering Iron: Temperature 350°C ± 10°C , dwell time shall be less than 3 sec.

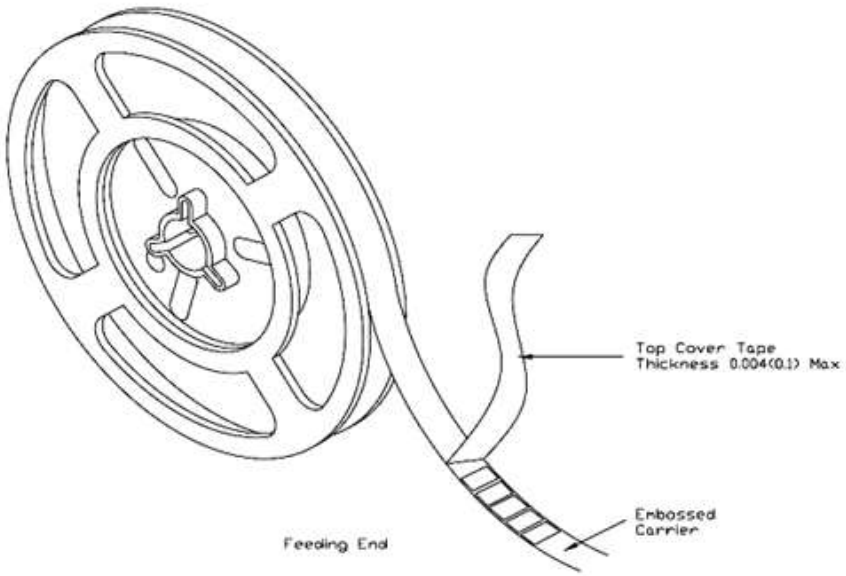
7. TAPING

7.1 Structure of Taping

Paper Carrier

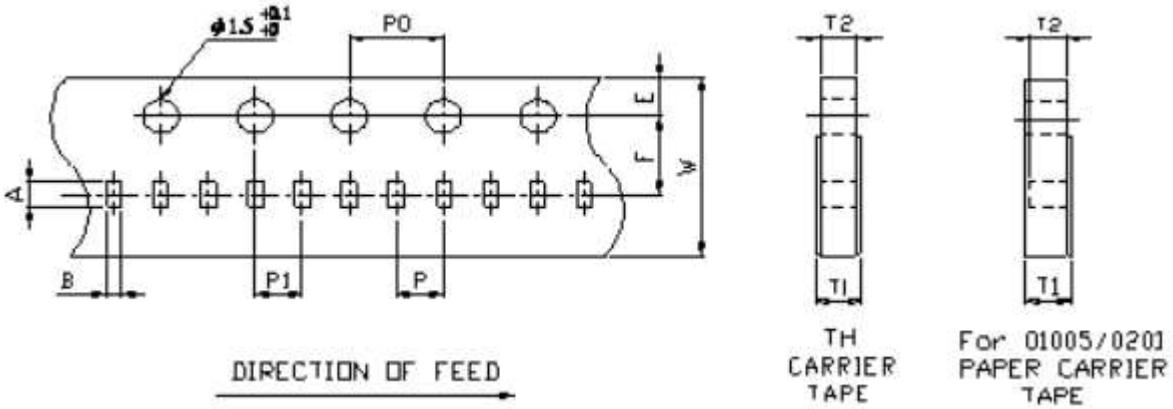


Embossed Plastic Carrier



7.2 Dimension

7.2.1 Dimension of Punched Paper Tape Carrier System(CPS10)



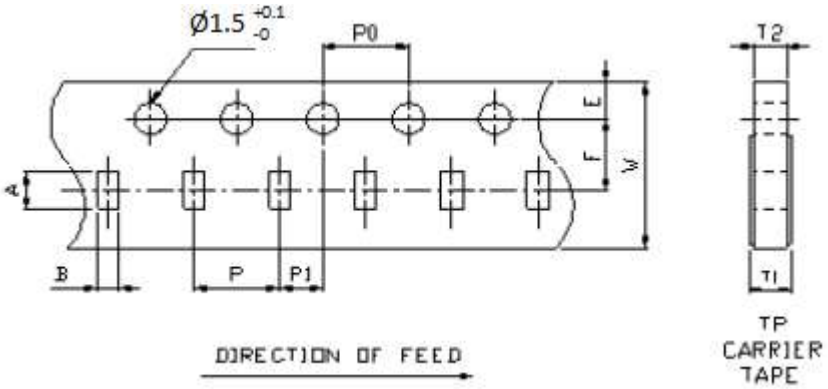
Remark : Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

Dimension of Punched Paper Tape Carrier System

(unit: mm)

Code	A	B	W	E	F	T1	T2	P	P0	P1	10P0
CPS10	1.15±0.03	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	$0.40^{+0.2}_{-0}$	0.40±0.05	2.00±0.10	4.00±0.05	2.00±0.05	40.0±0.20

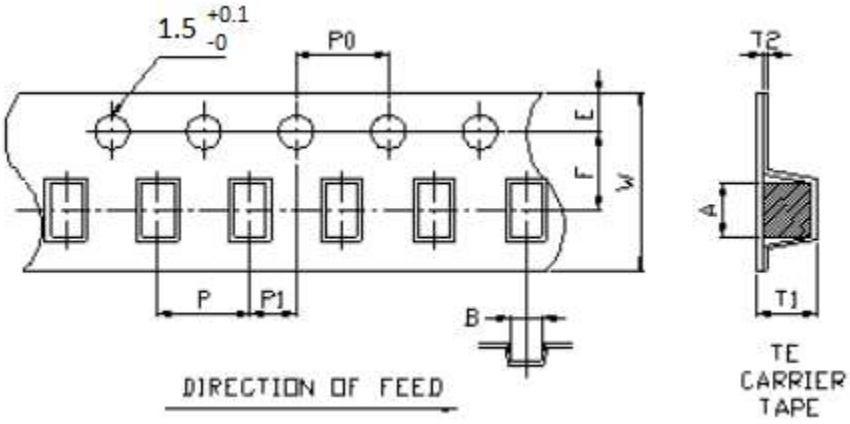
7.2.2 Dimension of Punched Paper Tape Carrier System (CPS16, 21, 32)



Dimension of Punched Paper Tape Carrier System (CPS - 16, 21, 32)

Code	A	B	W	E	F	T1	T2	P	P0	P1
CPS16	1.8±0.10	1.0±0.10	8.0±0.20	1.75±0.10	3.50±0.05	$0.60^{+0.2}_{-0}$	0.60±0.10	4.0±0.10	4.0±0.05	2.0±0.05
CPS21	2.3±0.10	1.55±0.1	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05
CPS32	3.5±0.20	1.9±0.20	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05

7.2.3 Dimension of Punched Paper Tape Carrier System (CPS50, 63)



Dimension of Punched Paper Tape Carrier System (CPS – 50, 63)

Code	A	B	W	E	F	T1	T2	P	P0	P1
CPS50	5.50 ± 0.20	2.80 ± 0.20	12.00 ± 0.20	1.75 ± 0.10	5.50 ± 0.05	1.10 ± 0.15	0.23 ± 0.15	4.0 ± 0.10	4.00 ± 0.05	2.00 ± 0.05
CPS63	6.70 ± 0.20	3.40 ± 0.20	12.00 ± 0.20	1.75 ± 0.10	5.50 ± 0.05	1.10 ± 0.15	0.23 ± 0.15	4.0 ± 0.10	4.00 ± 0.05	2.00 ± 0.05

7.3 Packaging

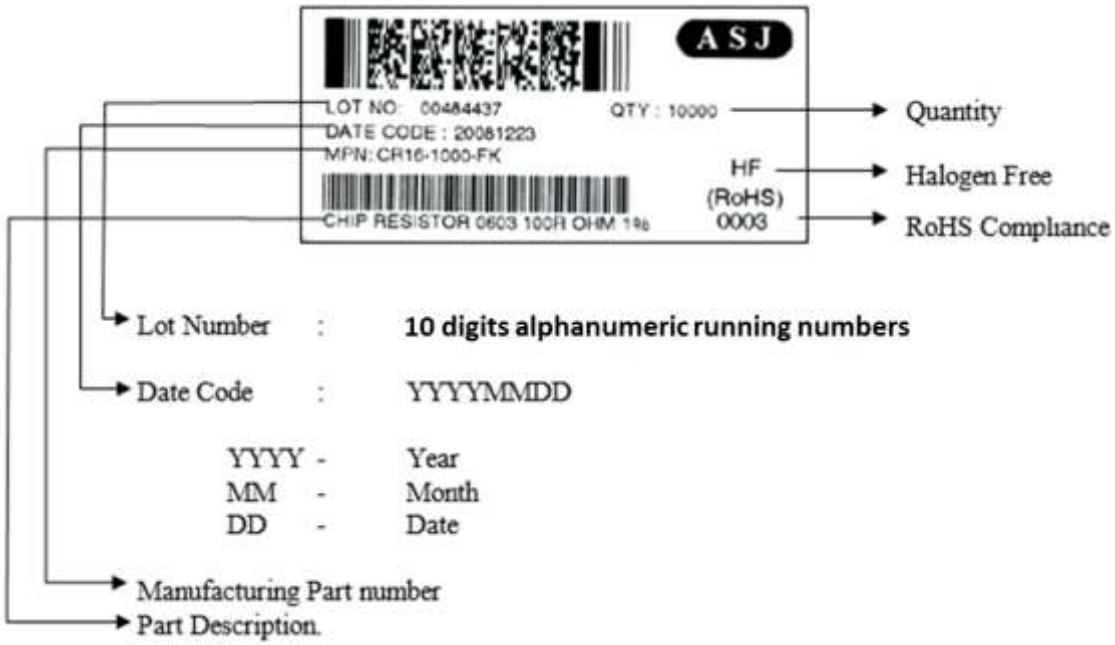
7.3.1 Taping

Quantity – Tape and Reels

Type	Qty(pcs/reel)	Reel	Remark
CPS10	10,000	7”	2mm pitch
	20,000	7”	2mm pitch
	50,000	13”	2mm pitch
CPS16	5,000	7”	4mm pitch
CPS21	10,000	10”	4mm pitch
CPS32	20,000	13”	4mm pitch
CPS50	4,000	7”	Embossed 4mm pitch
CPS63	4,000	7”	Embossed 4mm pitch

7.4 Identification

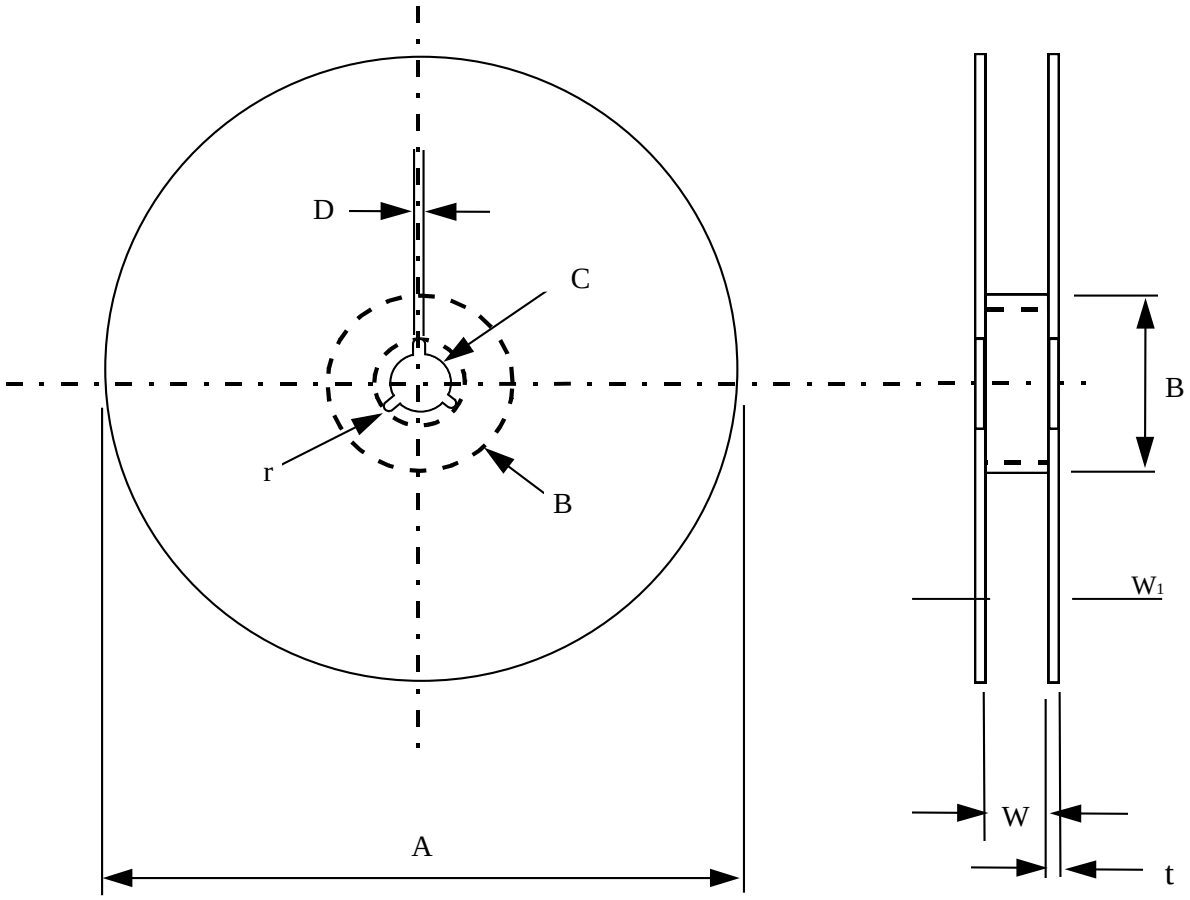
Production label that indicates the 10 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.4.1 Packaging Reel Box

Dimension	Reel Box	Number of Reels
185 × 60 × 186 mm	25K Box	5
185 × 120 × 186 mm	50K Box	10

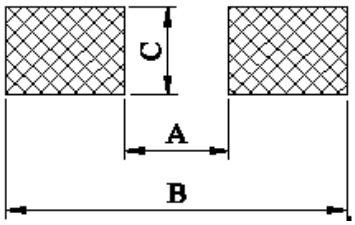
7.4.2 Reel Dimensions



Model	A	B	C	D	W	W_1	t	r
7"Reel (5K) (except 0402 10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
7"Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
7''Reel (10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
10"Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	1.5± 0.1	1.0
13"Reel (20K, 50K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	2.1± 0.1	-
13"Reel (20K)	ϕ330±1.0	ϕ100±1	13.5±0.5	2~3±0.5	10±0.5	-	-	-

8. SURFACE MOUNT LAND PATTERN DESIGN (FOR REFLOW SOLDERING)

When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.

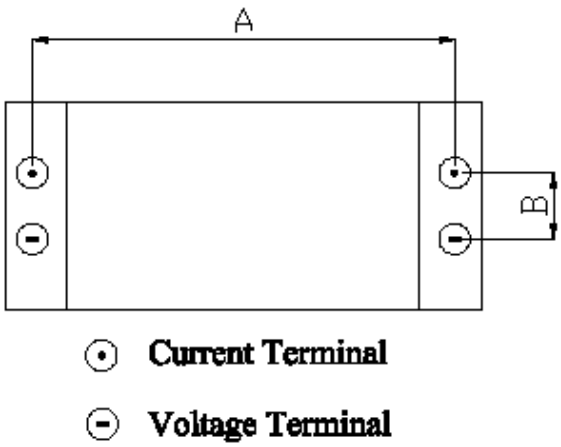


Unit:mm

TYPE \ DIM	A	B	C
CPS10	0.5	1.5	0.6
CPS16	0.8	2.1	0.9
CPS21	1.2	3.0	1.3
CPS32	2.2	4.2	1.6
CPS50	3.5	6.1	2.8
CPS63	3.8	8.0	3.5

9. MEASUREMENT POINT

Bottom Conductor Measure



Unit : mm

TYPE \ DIM	A	B
CPS10	**0.80±0.05**	**0.24±0.05**
CPS16	**1.35±0.05**	**0.35±0.05**
CPS21	**1.80±0.05**	**0.35±0.05**
CPS32	**2.90±0.05**	**0.35±0.05**
CPS50	**4.50±0.05**	**1.15±0.05**
CPS63	**5.90±0.05**	**1.60±0.05**

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTICE	DESCRIPTION
Version.1	13.02.2015		Initial Release
Version.2	02.05.2018		1.Update clause 1
			2.Update clause 2, insert CPS10,16, 50, and 63 product information
			3.Update clause 3.1.1, insert CPS10,16,50,63 information
			4.Update clause 3.10, insert related information into the table
			5.Update clause 4, insert related information into the table
			6.Update clause 5.1, insert related information into the table
			7.Update related information into clause 6.1, 6.2 and 6.3
			8.Update graph into clause 6.4.1
			9.Update graph into clause 7.1
			10.Update related information into clause 7.2.1, 7.2.2, and 7.2.3
			11.Update Tape and reel quantity into clause 7.3.2
			12.Update Reel dimension into clause 7.4.2
			13.Update Surface mount Land Pattern information into clause 8
			14. Insert Measurement point into clause 9
Version.3	19.12.2018		Datasheet update
Version.4	20.03.2019		Update clause 3.10 table
Version.5	20.06.2019		Update clause 3.9
Version.6	21.09.2020		Revise clause 3.5 Revise clause 8 Land pattern design
Version.7	05.11.2020		Revise clause 4 Marking on product
Version 8	16.11.2023		Revise clause 3.8 Product Assurance Revise clause 7.4 Identification.

DATA SHEET

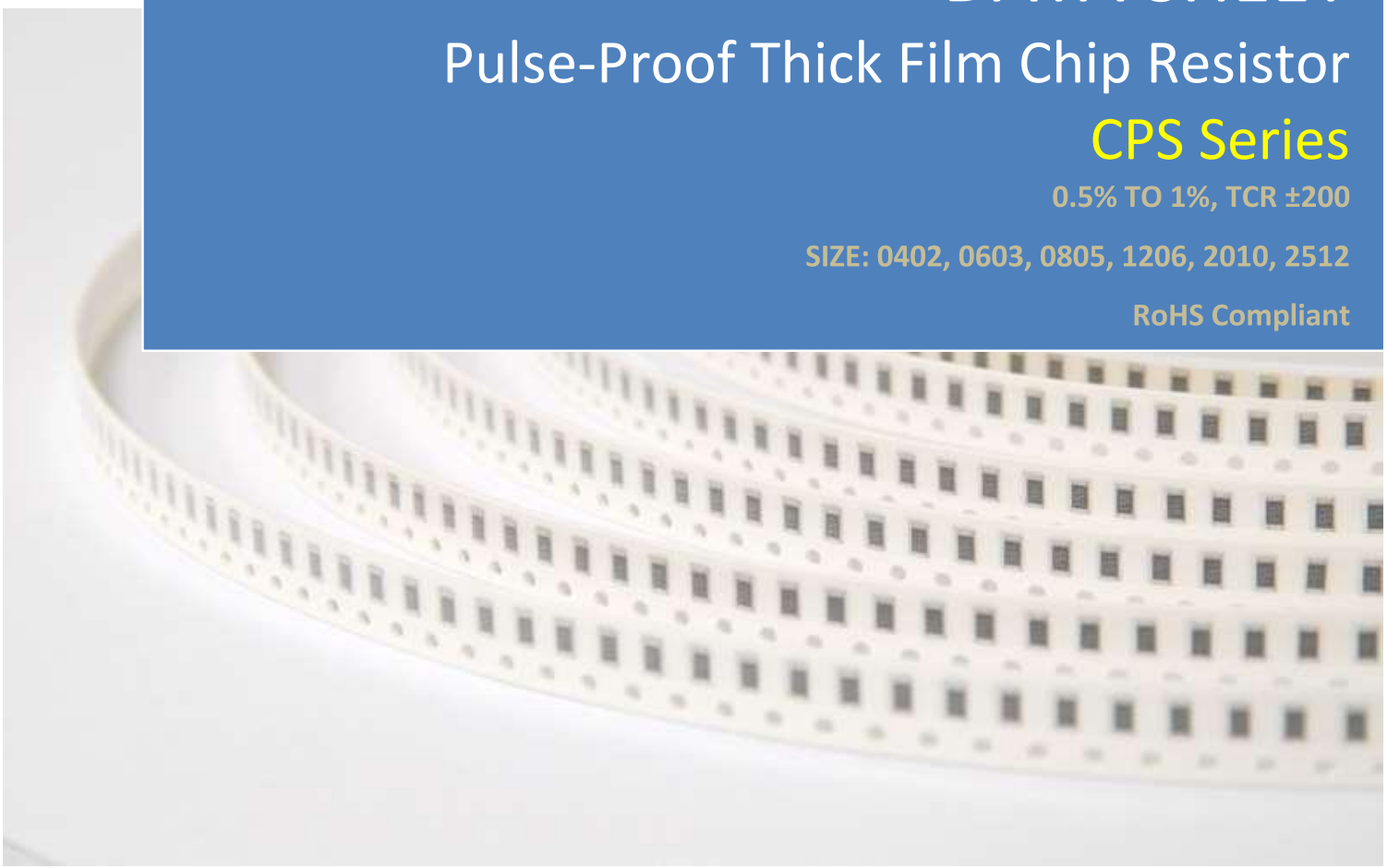
Pulse-Proof Thick Film Chip Resistor

CPS Series

0.5% TO 1%, TCR ±200

SIZE: 0402, 0603, 0805, 1206, 2010, 2512

RoHS Compliant



1. SCOPE

1.1 This specification is applicable to Lead-free and Halogen-free of RoHS Directive for CPS series Pulse-Proof thick film chip resistors.

1.2 The product is for general electronic purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CPS	21	-	XXXX			-	F	L
Series	Size		Nominal Resistance				Tolerance	Packaging
Pulse-Proof Thick Film Chip Resistors	10(0402/1005) 16(0603/1608) 21(0805/2012) 32(1206/3216) 50(2010/5025) 63(2512/6432)		Resistor	4-Digit	E96 Series 10.2Ω = 10R2 10KΩ = 1002		D = ±0.5% F = ±1%	E = 4000 pcs L = 5000 pcs K = 10000 pcs Y = 20000 pcs N = 50000 pcs

3. RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

Type	Rate Power at 70℃	Max. Working Voltage	Max. Overload Voltage
CPS10 (0402)	$\frac{1}{5}$W	50V	100V
CPS16 (0603)	$\frac{1}{3}$W	75V	150V
CPS21 (0805)	$\frac{1}{3.}$W	150V	300V
CPS32 (1206)	$\frac{1}{2}$W	200V	400V
CPS50 (2010)	$\frac{3}{4}$W	200V	400V
CPS63 (2512)	1W	200V	400V

3.2 Power Derating Curve:

Operating Temperature Range：- 55 ~ 155 ℃

For resistors operated in ambient temperatures above 70°C, power rating shall be derated in accordance with figure below.

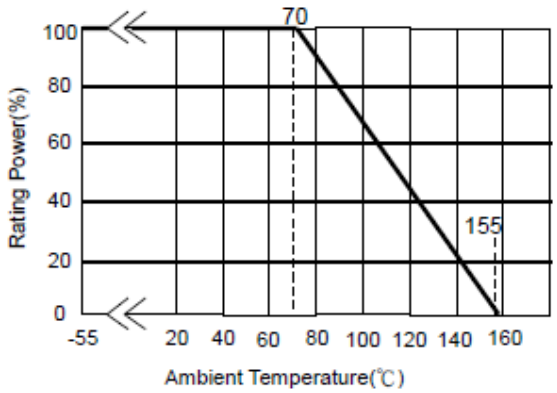


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature = + 5°C to +35°C

Relative Humidity = < 85% RH

Air Pressure = 86 kPa to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits:

Ambient Temperature = 20 ± 2°C

Relative Humidity = 60 to 70% RH

Air Pressure = 86 kPa to 106kPa

3.4 Operating Temperature Range -55°C to +155°C

3.5 Storage Temperature Range -5°C to + 40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance
ASJ resistor shall warranty 24 months from manufacturing date with control conditions.

3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance.

Type	Rate Power at 70℃	Max. Working Voltage	Max. Overload Voltage	T.C.R. (ppm/℃)	Resistance Range	
					D(±0.5%) E-96	F(±1%) E-96
CPS10 (0402)	1/5W	50V	100V	±200	1Ω≦R≦10M	
CPS16 (0603)	1/3 W	75V	150V	±200	1Ω≦R≦10M	
CPS21 (0805)	1/3.W	150V	300V	±200	1Ω≦R≦150KΩ	
CPS32 (1206)	1/2W	200V	400V	±200	1Ω≦R≦150KΩ	
CPS50 (2010)	3/4W	200V	400V	±200	1Ω≦R≦150KΩ	
CPS63 (2512)	1W	200V	400V	±200	1Ω≦R≦150KΩ	
Operating Temperature Range				-55℃ ~ +155℃		

3.11 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 from the following:

$$E = \sqrt{R \times P}$$

E= Rated voltage (v)
P= Power rating (w)
R= Nominal resistance(Ω)

4. MARKING ON PRODUCT

The nominal resistance shall be marked on the surface of each resistor

Part Number	Color	Marking on Product
CPS10 (0402)	-	No marking
CPS16 (0603)	Light Yellow	1) Tolerance; ± 0.5% (D), ±1% (F) Four Numerals Marking - CPS16 Marked as square
CPS21(0805)	Light Yellow	
CPS32(1206)	Light Yellow	
CPS50(2010)	Light Yellow	
CPS63(2512)	Light Yellow	

4.1 Numeric Numbering

4.1.1 0.5%, 1% Tolerance : ***Four Numerals Marking***

First 3 digits are significant figures, fourth digit is number of zeros.

Examples:

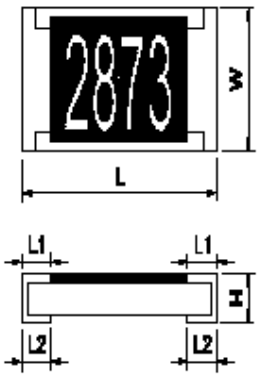
Nominal Resistance	***Marking***	***Remarks***
1 Ω	1R00	1 X 10^0 = 1
10 Ω	10R0	10 X 10^0 = 10
100 Ω	1000	100 X 10^0 = 100
4.7K Ω	4701	470 X 10^1 = 470 0
47K Ω	4702	470 X 10^2 = 470 00
470K Ω	4703	470 X 10^3 = 470 000
1M Ω	1004	100 X 10^4 = 100 0000

E-96 series

100	102	105	107	110	113	115	118	121	124	127	130
133	137	140	143	147	150	154	158	162	165	169	174
178	182	187	191	196	200	205	210	215	221	226	232
237	243	249	255	261	267	274	280	287	294	301	309
316	324	332	340	348	357	365	374	383	392	402	412
422	432	442	453	464	475	487	499	511	523	536	549
562	576	590	604	619	634	649	665	681	698	715	732
750	768	787	806	825	845	866	887	909	931	953	976

5. DIMENSION, CONSTRUCTION AND MATERIAL

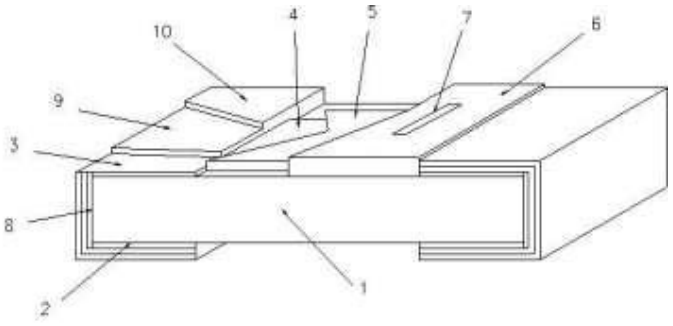
5.1 Dimension



Unit:mm

Type \ Dimension / Size Code		L	W	H	L1	L2
CPS10	**0402**	1.00±0.10	0.50±0.05	0.30±0.05	0.20±0.10	0.25±0.10
CPS16	**0603**	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.15	0.30±0.15
CPS21	**0805**	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.35±0.15
CPS32	**1206**	3.05±0.10	1.55±0.10	$0.50^{+0.10}_{-0.05}$	0.45±0.20	0.35±0.15
CPS50	**2010**	5.00±0.20	2.50±0.20	0.55±0.10	0.60±0.20	0.60±0.20
CPS63	**2512**	6.30±0.20	3.20±0.20	0.55±0.10	0.60±0.20	0.60±0.20

5.2 Structure Graph



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Marking
3	Top inner electrode	8	Terminal inner electrode
4	Resistive layer	9	Ni plating
5	1st Protective coating	10	Sn plating

5.3 Plating Thickness

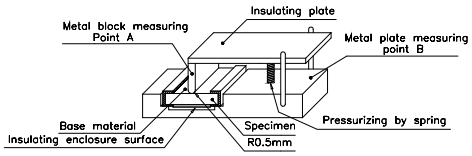
Ni : ≧ 2 µm

Sn (Tin): ≧ 3 µm

Sn (Tin): Matte Sn

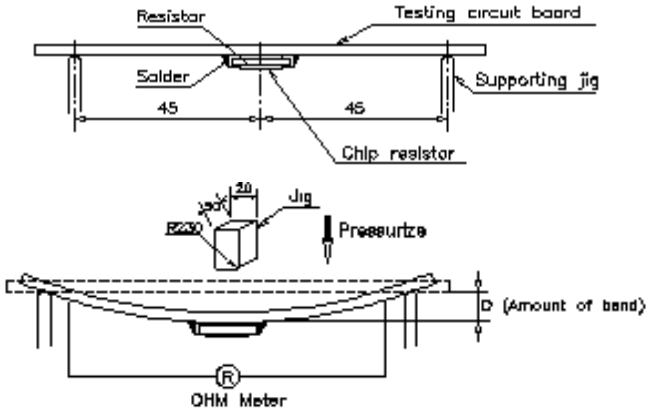
6. RELIABILITY TEST

6.1 Electrical Performance Test

Item	Conditions	Specifications Resistors
Temperature Coefficient of Resistance	***Refer to JIS-C5201-1 4.8*** $TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^6$ R1: Resistance at room temperature R2: Resistance at -55℃ or +125℃ T1: Room temperature T2: Temperature -55℃ or +125℃	Refer to item 3.10 general specifications
Short Time Overload	***Refer to JIS-C5201-1 4.13*** Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3.10)	△R%=±0.5%
Insulation Resistance	***Refer to JIS-C5201-1 4.6*** Put the resistor in the fixture, add 100 VDC in + ,- terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material. 	≧$10^9\Omega$
Dielectric Withstand Voltage	***Refer to JIS-C5201-1 4.7*** Put the resistor in the fixture, add VAC (see spec. below) in +,- terminal for. CPS10、16 apply 300 VAC 1 minute. CPS21、32、50、63 apply 500 VAC 1 minute.	No short or burned on the appearance.
Intermittent Overload	***Refer to JIS-C5201-1 4.13*** Put the tested resistor in chamber under temperature 25±2℃ and load the rated DC voltage for 1 sec on , 25 sec off , $10{,}000^{+400}_{-0}$ test cycles, then it be left at no-load for 1 hour , then measure its resistance variance rate.	△R%=±1.0%
ESD	***Refer to EIAJED-4701-300 304*** Put the specimens on the test fixture and apply ±3KVDC on terminals for 1sec .Afterwards, the specimens stabilize for 30min or more and measure of its resistance variance rate.	△R%=±5.0%

6.2 Mechanical Performance Test

Item	Conditions	Specifications Resistors
Terminal Strength	***Refer to JIS-C5201-1 4.16*** Test1: The resistor mounted on the board applied 5N pushing force on the sample rear for 10 sec. Test2: The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown.	Test1:No evidence of mechanical damage. Test2:≧5N
Resistance to Solvent	***Refer to JIS-C5201-1 4.29*** The tested resistor be immersed into isopropyl alcohol of 20~25℃for 5 minutes, then the resistor is left in the room for 48 hrs., and measured its resistance variance rate.	△R%=±0.5%
Solderability	***Refer to JIS-C5201-1 4.17*** Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105℃, humidity of 100% RH, and pressure of 1.22×10^5 Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: The resistor be immersed into solder pot in temperature 235±5℃ for 2±0.5 sec, then the resistor is left as placed under microscope to observe its solder area.	Solder coverage over 95%
Resistance to Soldering Heat	***Refer to JIS-C5201-1 4.18*** ◎Test method 1 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 10^{+1}_{-0} seconds. Then the resistor is left in the room for 1 hour. ◎Test method 2 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 30^{+1}_{-0} seconds. Then the resistor is left as placed under microscope to observe its solder area. ◎Test method 3 (Electric iron test): Preheating temperature: 350±10℃ Electric iron preheating time : 3^{+1}_{-0} sec Preheating the electric iron on electrode termination, as after that step placed the iron over 60 min. and measured its resistance variance rate.	Test item 1: (1)Variance rate on resistance △R%=±0.5% Test item 2: (1)Solder coverage over 95%. (2)The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode. Test item 3: (1)Variance rate on resistance △R%=±0.5%

Item	Conditions	Specifications
		Resistors
Joint Strength of Solder	***Refer to JIS-C5201-1 4.33*** ◎Bending Strength: Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate. D:CPS10、16、21=5mm CPS32=3mm CPS50、63=2mm 	△R%=±1.0%

6.3 Environmental Test

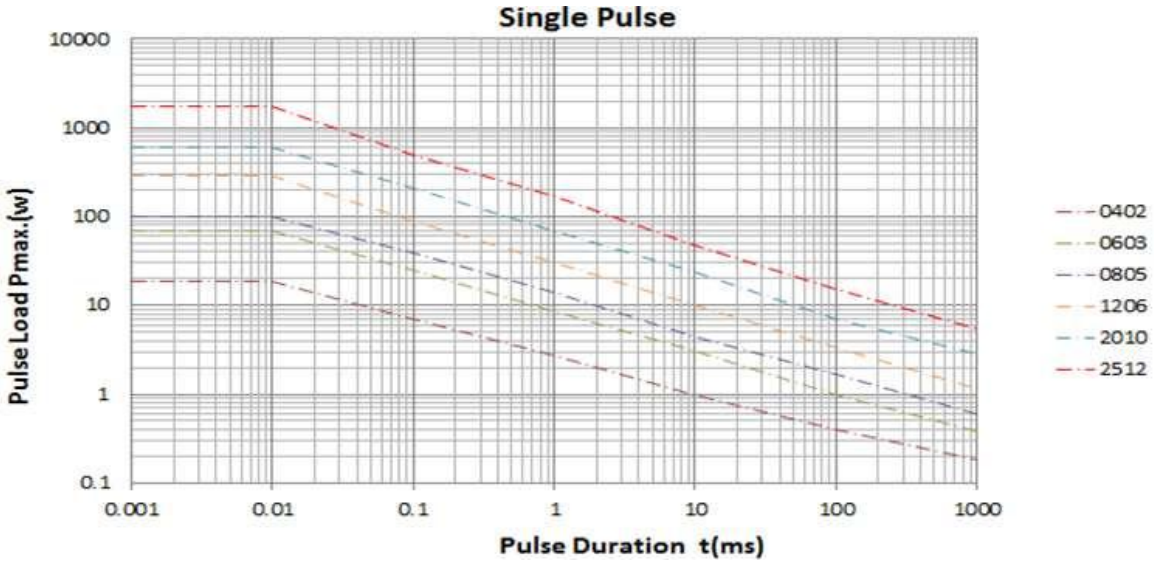
<table>
<tr><th rowspan="2">Item</th><th rowspan="2">Conditions</th><th>Specifications</th></tr>
<tr><th>Resistors</th></tr>
<tr><td>Resistance to Dry Heat</td><td>Refer to JIS-C5201-1 4.25
Put tested resistor in chamber under temperature 155±5℃ for 1000^{+48}_{-0} hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
<tr><td>Thermal Shock</td><td>Refer to MIL-STD 202 Method 107
Put the tested resistor in the chamber under the Thermal Shock which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate.
<table>
<tr><th colspan="2">Testing Condition</th></tr>
<tr><td>Lowest Temperature</td><td>-55±5℃</td></tr>
<tr><td>Highest Temperature</td><td>125±5℃</td></tr>
<tr><td>Temperature-retaining time</td><td>15 minutes each</td></tr>
</table></td><td>△R%=±1.0%</td></tr>
<tr><td>Loading Life in Moisture</td><td>Refer to JIS-C5201-1 4.24
Put the tested resistor in the chamber under temperature 40±2℃, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
<tr><td>Load Life</td><td>Refer to JIS-C5201-1 4.25
Put the tested resistor in chamber under temperature 70±2℃ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.</td><td>△R%=±1.0%</td></tr>
</table>

6.4 Pulse Loading Capability

6.4.1 Single Pulse Load:

Pulse on a regular basis; maximum permissible peak pulse power (Pmax) as a function of a pulse duration.

V_{peak} ≦CPS10(100V), CPS16(150V), CPS21(300V), CPS32(400V), CPS50(400V), CPS63(400V)

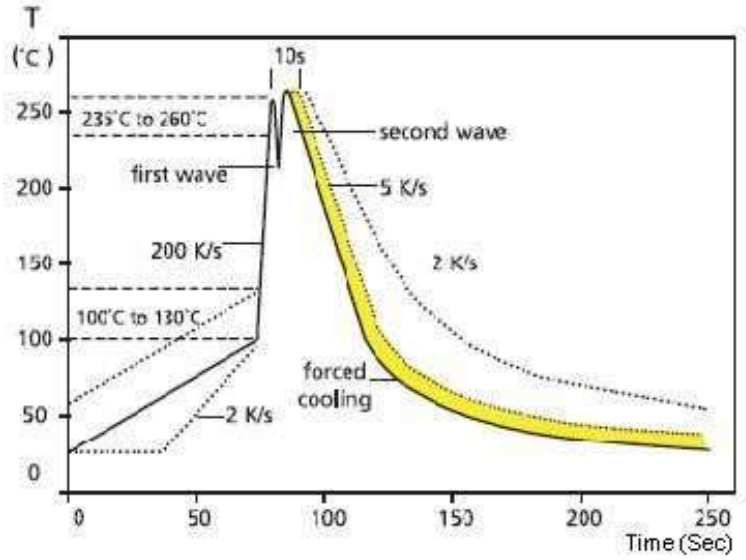


6.5 Soldering Profile

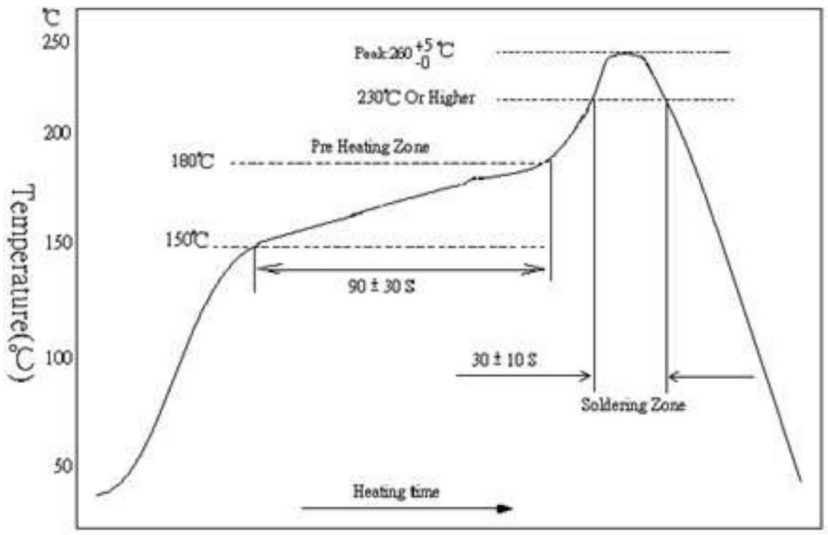
Technical application notes: This is for recommendation, customer please perform adjustment according to the actual application.

6.5.1 Lead-Free Double Wave Soldering Profile

(This applies to 0603 size inclusive above products)



6.5.2 Lead-Free IR Reflow Soldering Profile

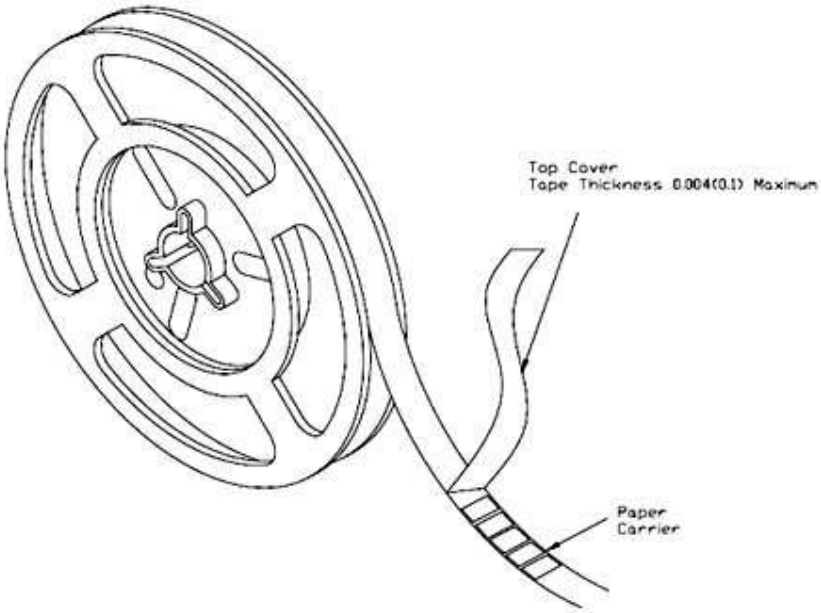


6.5.3 Soldering Iron: Temperature 350°C ± 10°C , dwell time shall be less than 3 sec.

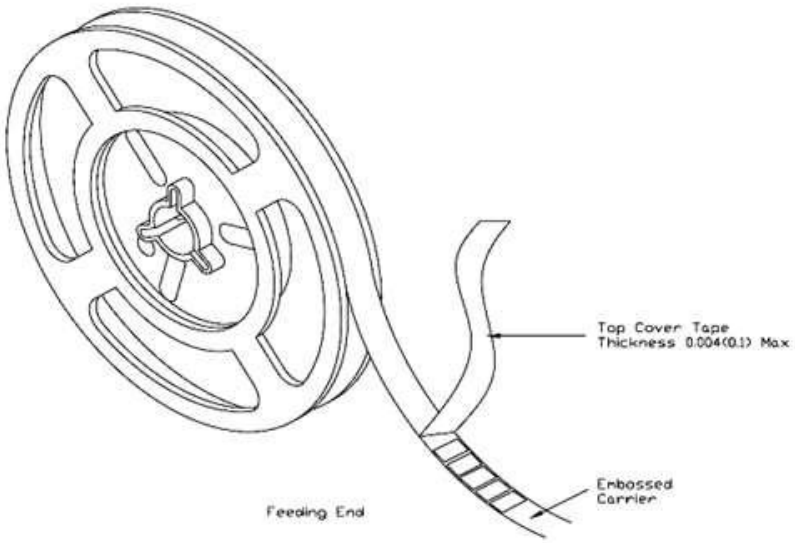
7. TAPING

7.1 Structure of Taping

Paper Carrier

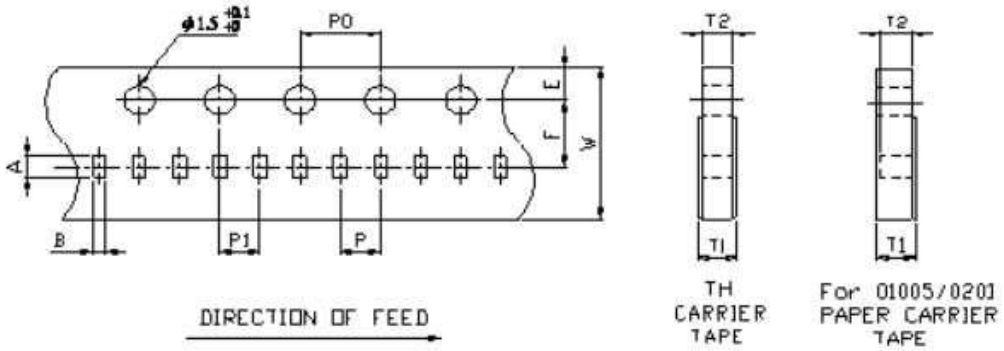


Embossed Plastic Carrier



7.2 Dimension

7.2.1 Dimension of Punched Paper Tape Carrier System(CPS10)



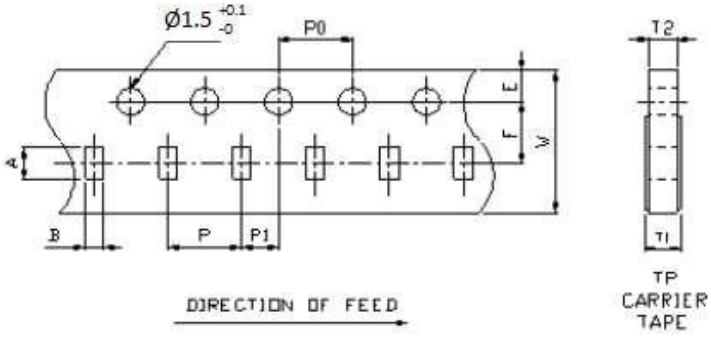
Remark : Pitch tolerance over any 10 pitches of Po is ± 0.2 mm

Dimension of Punched Paper Tape Carrier System

(unit: mm)

Code	A	B	W	E	F	T1	T2	P	P0	P1	10P0
CPS10	1.15±0.03	0.65±0.05	8.00±0.20	1.75±0.10	3.50±0.05	$0.40^{+0.2}_{-0}$	0.40±0.05	2.00±0.10	4.00±0.05	2.00±0.05	40.0±0.20

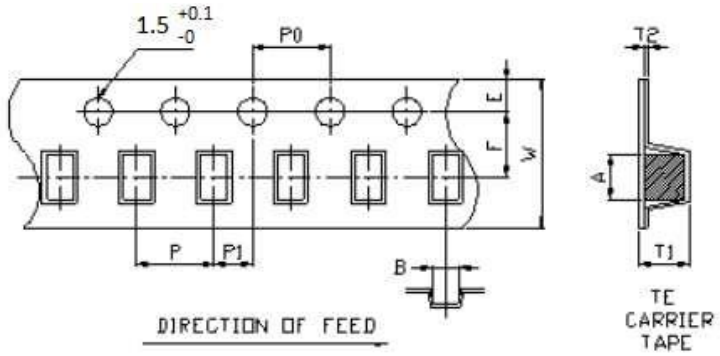
7.2.2 Dimension of Punched Paper Tape Carrier System (CPS16, 21, 32)



Dimension of Punched Paper Tape Carrier System (CPS - 16, 21, 32)

Code	A	B	W	E	F	T1	T2	P	P0	P1
CPS16	1.8±0.10	1.0±0.10	8.0±0.20	1.75±0.10	3.50±0.05	$0.60^{+0.2}_{-0}$	0.60±0.10	4.0±0.10	4.0±0.05	2.0±0.05
CPS21	2.3±0.10	1.55±0.1	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05
CPS32	3.5±0.20	1.9±0.20	8.0±0.20	1.75±0.10	3.50±0.05	$0.75^{+0.2}_{-0}$	0.75±0.10	4.0±0.10	4.0±0.05	2.0±0.05

7.2.3 Dimension of Punched Paper Tape Carrier System (CPS50, 63)



Dimension of Punched Paper Tape Carrier System (CPS – 50, 63)

Code	A	B	W	E	F	T1	T2	P	P0	P1
CPS50	5.50 ± 0.20	2.80 ± 0.20	12.00 ± 0.20	1.75 ± 0.10	5.50 ± 0.05	1.10 ± 0.15	0.23 ± 0.15	4.0 ± 0.10	4.00 ± 0.05	2.00 ± 0.05
CPS63	6.70 ± 0.20	3.40 ± 0.20	12.00 ± 0.20	1.75 ± 0.10	5.50 ± 0.05	1.10 ± 0.15	0.23 ± 0.15	4.0 ± 0.10	4.00 ± 0.05	2.00 ± 0.05

7.3 Packaging

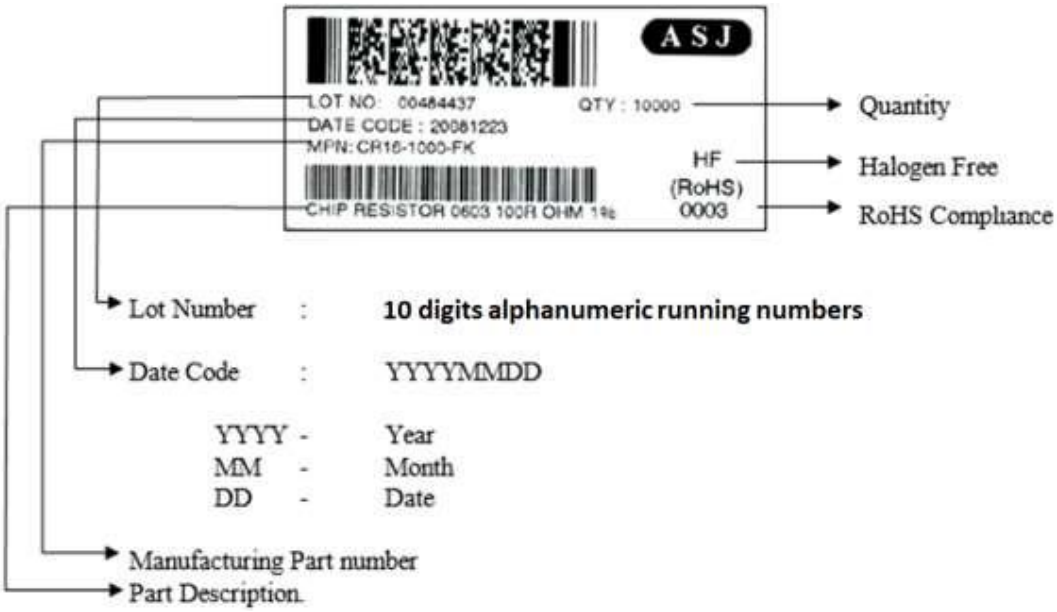
7.3.1 Taping

Quantity – Tape and Reels

Type	Qty(pcs/reel)	Reel	Remark
CPS10	10,000	7”	2mm pitch
	20,000	7”	2mm pitch
	50,000	13”	2mm pitch
CPS16	5,000	7”	4mm pitch
CPS21	10,000	10”	4mm pitch
CPS32	20,000	13”	4mm pitch
CPS50	4,000	7”	Embossed 4mm pitch
CPS63	4,000	7”	Embossed 4mm pitch

7.4 Identification

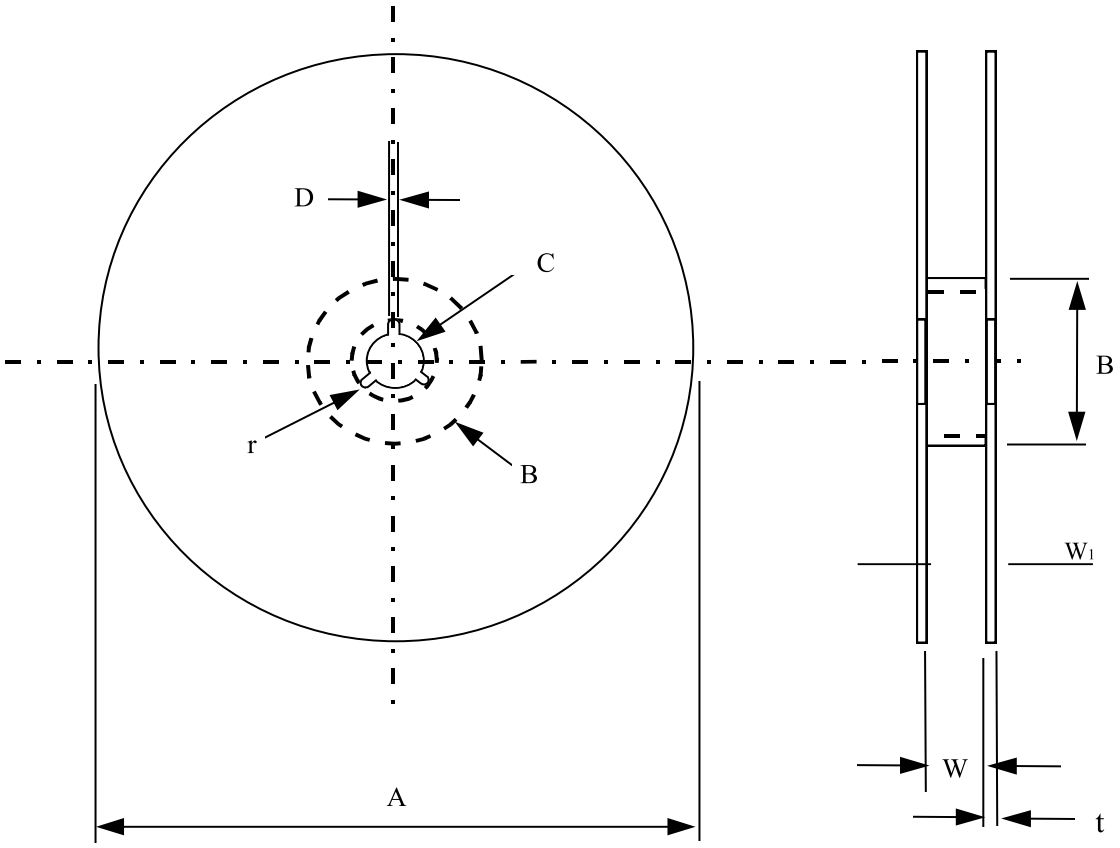
Production label that indicates the 10 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.4.1 Packaging Reel Box

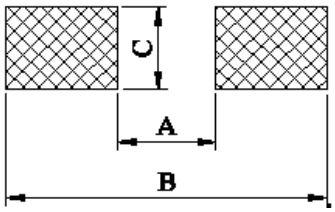
Dimension	Reel Box	Number of Reels
185 × 60 × 186 mm	25K Box	5
185 × 120 × 186 mm	50K Box	10

7.4.2 Reel Dimensions



Model	A	B	C	D	W	W_1	t	r
7"Reel (5K) (except 0402 10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
7"Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
7''Reel (10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
10"Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	1.5± 0.1	1.0
13"Reel (20K, 50K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	2.1± 0.1	-
13"Reel (20K)	ϕ330±1.0	ϕ100±1	13.5±0.5	2~3±0.5	10±0.5	-	-	-

8. SURFACE MOUNT LAND PATTERNS

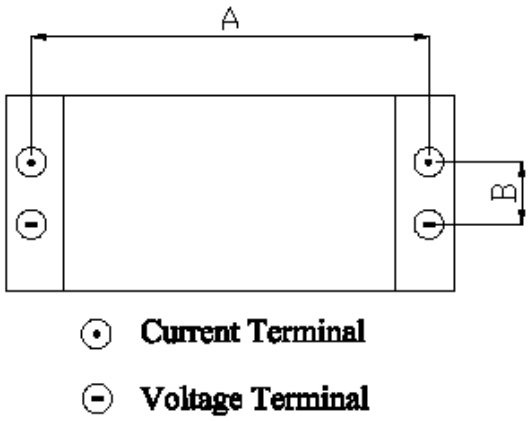


Unit:mm

TYPE \ DIM	A	B	C
CPS10	0.5	1.5	0.6
CPS16	0.8	2.1	0.9
CPS21	1.2	3.0	1.3
CPS32	2.2	4.2	1.6
CPS50	3.5	6.1	2.8
CPS63	3.8	8.0	3.5

9. MEASUREMENT POINT

Bottom Conductor Measure



Unit : mm

TYPE \ DIM	A	B
CPS10	0.80±0.05	0.24±0.05
CPS16	1.35±0.05	0.35±0.05
CPS21	1.80±0.05	0.35±0.05
CPS32	2.90±0.05	0.35±0.05
CPS50	4.50±0.05	1.15±0.05
CPS63	5.90±0.05	1.60±0.05

10. REVISION HISTORY

REVISION	DATE	CHANGE NOTICE	DESCRIPTION
Version.1	19.12.2018		Initial Release
Version.2	14.11.2019		Revise clause 3.1.1 Resistor rated power table Revise clause 3.9 Revise clause 3.10 TCR table.
Version.3	13.10.2020		Revise clause 3.5 Storage temp. range
Version.4	05.11.2020		Revise clause 4 Marking on product
Version 5	21.12.2023		Revise clause 3.8 Product Assurance. Revise clause 7.4 Identification

ASJ

DATA SHEET

Pulse-Proof Low-Resistance Thick Film Chip Resistor

CPS Series

1% TO 5%, TCR ±400

SIZE: 2512

1. SCOPE

1.1 This specification is applicable to Lead-free and Halogen-free of RoHS Directive for CPS Series Pulse-Proof Low-Resistance Thick Film Chip Resistor.

1.2 The product is for general electronic purpose.

2. PART NUMBERING SYSTEM

Part Numbering is made in accordance with the following system:

CPS	63	-	R100			-	F	E
Series	Size		Nominal Resistance				Tolerance	Packaging
Pulse-Proof Low-Resistance Thick Film Chip Resistors	63(2512/6432)		Resistor	4-Digit	EX. 0.10Ω=R100 0.47Ω=R470 0.56Ω=R560		F = ±1% J = ±5%	E = 4000 pcs

3. RATING

3.1 Rated Power

3.1.1 Resistor Rated Power

Type	Rate Power at 70℃	Max. Working Current	Max. Overload Current
CPS63 (2512)	2W	3.16A	7.90A

3.2 Power Derating Curve:

Operating Temperature Range：- 55 ~ 155 ℃

For resistors operated in ambient temperatures above 70℃, power rating shall be derated in accordance with figure below。

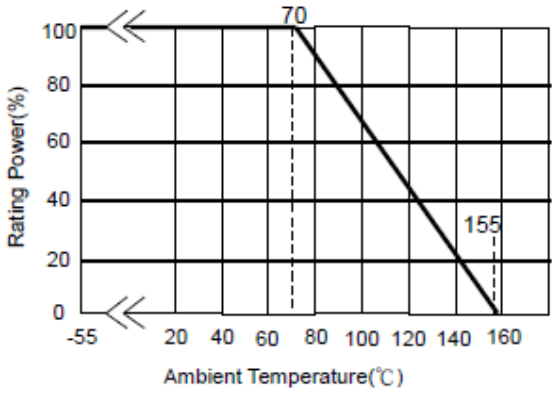


Fig.1 Power Derating Characteristics

3.3 Standard Atmospheric Condition

Unless otherwise specified, the standard range of atmospheric conditions for making measurements and tests is as follows:

Ambient Temperature = + 5°C to +35°C

Relative Humidity = < 85% RH

Air Pressure = 86 kPa to 106kPa

If there may be any doubt about the results, measurement shall be made within the following limits:

Ambient Temperature = 20 ± 2°C

Relative Humidity = 60 to 70% RH

Air Pressure = 86 kPa to 106kPa

3.4 Operating Temperature Range -55°C to +155°C

3.5 Storage Temperature Range -5°C to + 40°C / < 85% RH

3.6 Flammability Rating Tested in accordance to UL-94, V-0

3.7 Moisture Sensitivity Level Rating: Level 1

3.8 Product Assurance

ASJ resistor shall warranty 24 months from manufacturing date with control conditions.

3.9 ASJ resistors are RoHS-compliant in accordance to RoHS Directive.

3.10 Resistance, Resistance Tolerance and Temperature Coefficient of Resistance.

Type	Rate Power at 70℃	Max. Working Current	Max. Overload Current	T.C.R (ppm/℃)	Resistance Range
					F(±1%)、J(±5%) E-24、E-96
CPS63 (2512)	2W	3.16A	7.90A	±400	200mΩ≦R＜1Ω
Operating Temperature Range					-55℃ ~ +155℃

3.11 Current Rating:

Rated Current: DC Current or AC Current (rms) based on the rated power.

The current can be calculated by the following formula. If the calculated value exceeds the Max. current specified in the Table 3.10, the Max. current rating is set as the current rating.

$$I = \sqrt{P/R}$$

I= Rated current (A)

P= Power rating (w)

R= Resistance(Ω)

4. MARKING ON PRODUCT

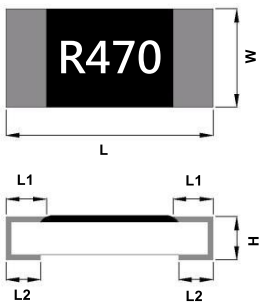
The nominal resistance shall be marked on the surface of each resistor

Type	Resistance Range	Tolerance≦1%	Tolerance > 1%
CPS63	＜1Ω	4-digits Marking	4-digits Marking
	≧1Ω	4-digits Marking	3-digits Marking
	Jumper=0Ω	3-digits Marking	1-digit Marking

5. DIMENSION, CONSTRUCTION AND MATERIAL

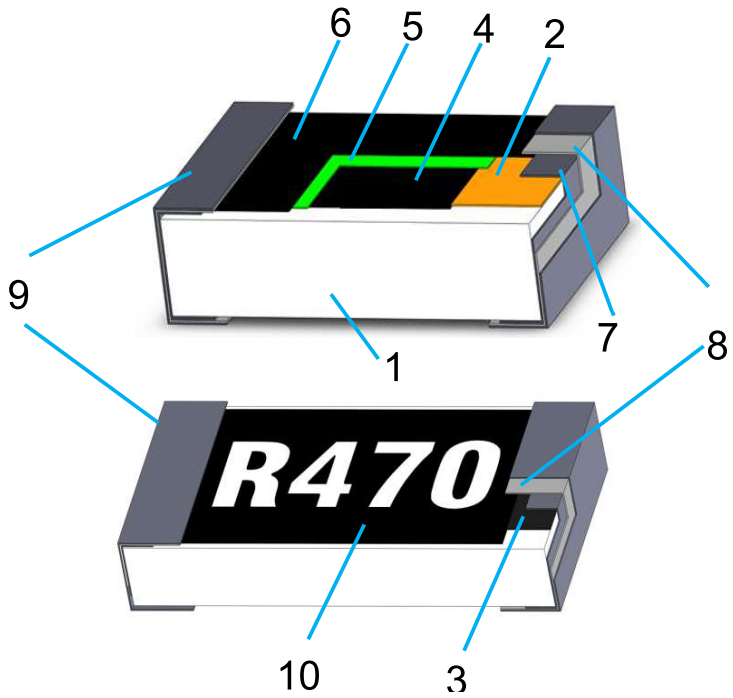
5.1 Dimension

Unit:mm



Type / Size Code	Dimension L	W	H	L1	L2
CPS63 / 2512	6.40±0.20	3.20±0.20	0.70±0.10	0.72±0.20	0.69±0.20

5.2 Structure Graph



1	Ceramic substrate	6	2nd Protective coating
2	Bottom inner electrode	7	Terminal inner electrode
3	Top inner electrode	8	Ni plating
4	Resistive layer	9	Sn plating
5	1st Protective coating	10	G2+MK layer

5.3 Plating Thickness

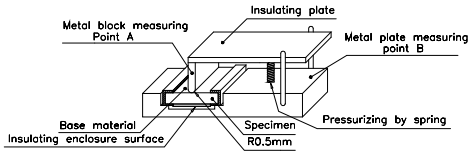
5.3.1 Ni: ≧ 2 μm

5.3.2 Sn(Tin): ≧ 3 μm

5.3.3 Sn(Tin): Matte Sn

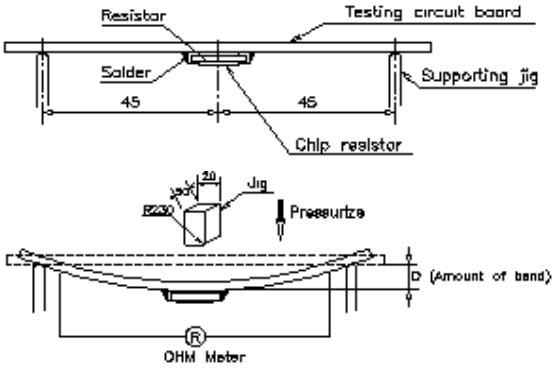
6. RELIABILITY TEST

6.1 Electrical Performance Test

Item	Conditions	Specifications
		Resistors
Temperature Coefficient of Resistance	***Refer to JIS-C5201-1 4.8*** $TCR(ppm/^{\circ}C) = \frac{(R2-R1)}{R1(T2-T1)} x10^6$ R1: Resistance at room temperature R2: Resistance at -55℃ or +125℃ T1: Room temperature T2: Temperature -55℃ or +125℃	Refer to item 3.10
Short Time Overload	***Refer to JIS-C5201-1 4.13*** Applied 2.5 times rated voltage for 5 seconds and release the load for about 30 minutes, then measure its resistance variance rate. (Rated voltage refer to item 3.10)	△R%=±2.0%
Insulation Resistance	***Refer to JIS-C5201-1 4.6*** Put the resistor in the fixture, add 100 VDC in + ,- terminal for 60 sec then measured the insulation resistance between electrodes and insulating enclosure or between electrodes and base material. 	≧$10^9\Omega$
Dielectric Withstand Voltage	***Refer to JIS-C5201-1 4.7*** Put the resistor in the fixture, add VAC (see spec. below) in +,- terminal for. CPS63 apply 500 VAC 1 minute.	No short or burned on the appearance.
Intermittent Overload	***Refer to JIS-C5201-1 4.13*** Put the tested resistor in chamber under temperature 25±2℃ and load the rated DC voltage for 1 sec on , 25 sec off , 10000^{+400}_{-0} test cycles, then it be left at no-load for 1 hour , then measure its resistance variance rate.	△R%=±2.0%
ESD	***Refer to EIAJED-4701-300 304*** Put the specimens on the test fixture and apply ±3KVDC on terminals for 1sec .Afterwards, the specimens stabilize for 30min or more and measure of its resistance variance rate.	△R%=±5.0%

6.2 Mechanical Performance Test

Item	Conditions	Specifications Resistors
Terminal Strength	***Refer to JIS-C5201-1 4.16*** Test1: The resistor mounted on the board applied 5N pushing force on the sample rear for 10 sec. Test2: The resistor mounted on the board slowly add force on the sample rear until the sample termination is breakdown.	Test1:No evidence of mechanical damage. Test2:≧5N
Resistance to Solvent	***Refer to JIS-C5201-1 4.29*** The tested resistor be immersed into isopropyl alcohol of 20~25℃for 5 minutes, then the resistor is left in the room for 48 hrs., and measured its resistance variance rate.	△R%=±1.0%
Solderability	***Refer to JIS-C5201-1 4.17*** Preconditioning: Put the tested resistor in the apparatus of PCT, at a temperature of 105℃, humidity of 100% RH, and pressure of 1.22×10^5 Pa for a duration of 4 hours. Then after left the tested resistor in room temperature for 2 hours or more. Test method: The resistor be immersed into solder pot in temperature 235±5℃ for 2±0.5 sec, then the resistor is left as placed under microscope to observe its solder area.	Solder coverage over 95%
Resistance to Soldering Heat	***Refer to JIS-C5201-1 4.18*** ◎Test method 1 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 10^{+1}_{-0} seconds. Then the resistor is left in the room for 1 hour. ◎Test method 2 (solder pot test): The tested resistor be immersed into molten solder of 260^{+5}_{-0} ℃ for 30^{+1}_{-0} seconds. Then the resistor is left as placed under microscope to observe its solder area. ◎Test method 3 (Electric iron test): Preheating temperature: 350±10℃ Electric iron preheating time : 3^{+1}_{-0} sec Preheating the electric iron on electrode termination, as after that step placed the iron over 60 min. and measured its resistance variance rate.	Test item 1: (1)Variance rate on resistance △R%=±2.0% Test item 2: (1)Solder coverage over 95%. (2)The underlying material (such as ceramic) shall not be visible at the crest corner area of the electrode. Test item 3: (1)Variance rate on resistance △R%=±2.0%

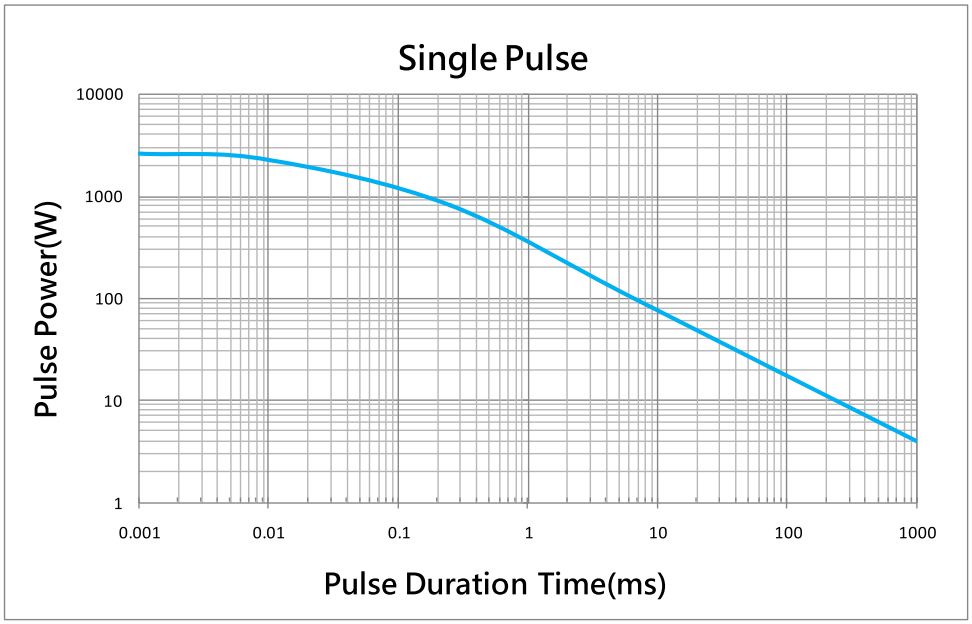
Item	Conditions	Specifications Resistors
Joint Strength of Solder	***Refer to JIS-C5201-1 4.33*** ◎Bending Strength: Solder tested resistor on to PC board. Add force in the middle down, and under load measured its resistance variance rate. D: CPS63=2mm  	△R%=±1.0% No evidence of mechanical damage. No terminal peeling off and core body cracked.

6.3 Environmental Test

Item	Conditions	Specifications Resistors
Resistance to Dry Heat	***Refer to JIS-C5201-1 4.25*** Put tested resistor in chamber under temperature 155±5℃ for 1000^{+48}_{-0} hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	△R%=±2.0%
Thermal Shock	***Refer to MIL-STD 202 Method 107*** Put the tested resistor in the chamber under the Thermal Shock which shown in the following table shall be repeated 300 times consecutively. Then leaving the tested resistor in the room temperature for 1 hours, and measure its resistance variance rate. Testing Condition Lowest Temperature: -55±5℃ Highest Temperature: 125±5℃ Temperature-retaining time: 15 minutes each	△R%=±2.0%
Loading Life in Moisture	***Refer to JIS-C5201-1 4.24*** Put the tested resistor in the chamber under temperature 40±2℃, relative humidity 90~95% and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	△R%=±3.0%
Load Life	***Refer to JIS-C5201-1 4.25*** Put the tested resistor in chamber under temperature 70±2℃ and load the rated voltage for 90 minutes on, 30 minutes off, total 1000 hours. Then leaving the tested resistor in room temperature for 60 minutes, and measure its resistance variance rate.	△R%=±3.0%

6.4 Pulse Loading Capability

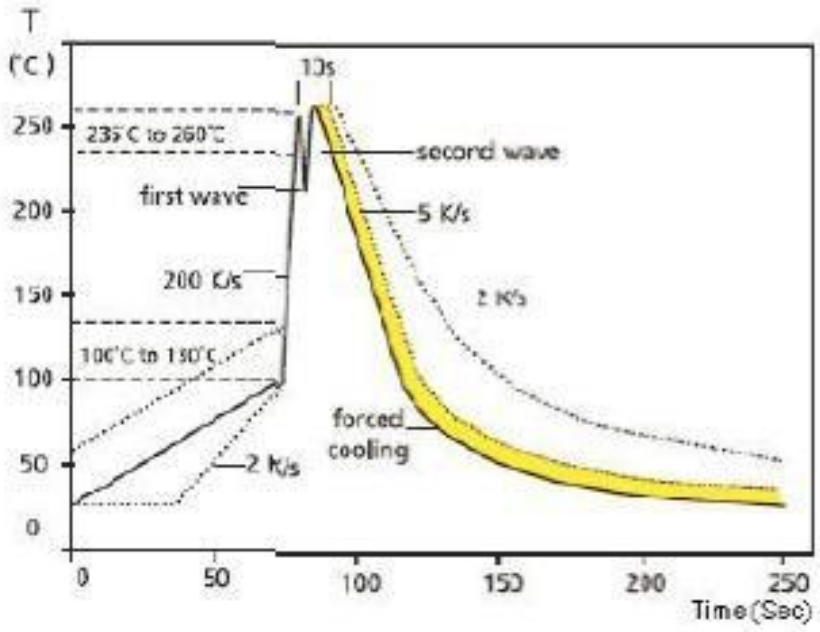
6.4.1 Single pulse power is shown in the curve below, maximum permissible peak current (I_{peak}) cannot exceed 7.90A when the maximum pulse power(P_{max}) transforms to the current.



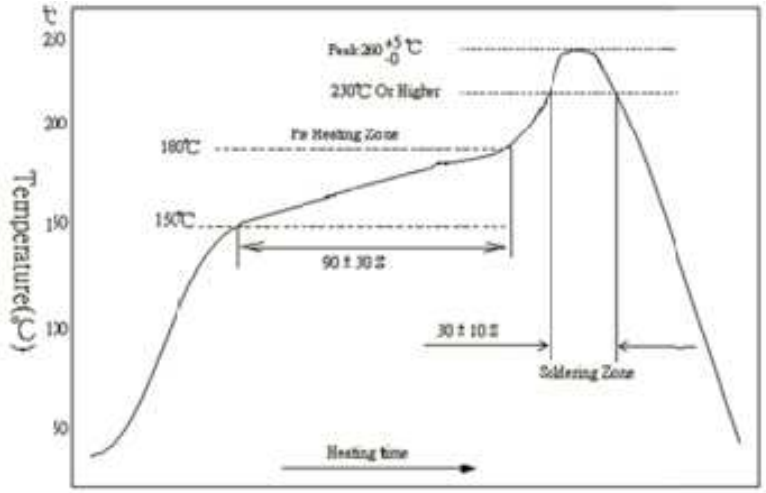
6.5 Technical application notes: (This is for recommendation, customer are please to perform adjustment according to the actual application)

Soldering Profile

6.5.1 Lead-free double wave soldering profile (This applies to 0603 size inclusive above products)



6.5.2 Lead-Free IR Reflow Soldering Profile

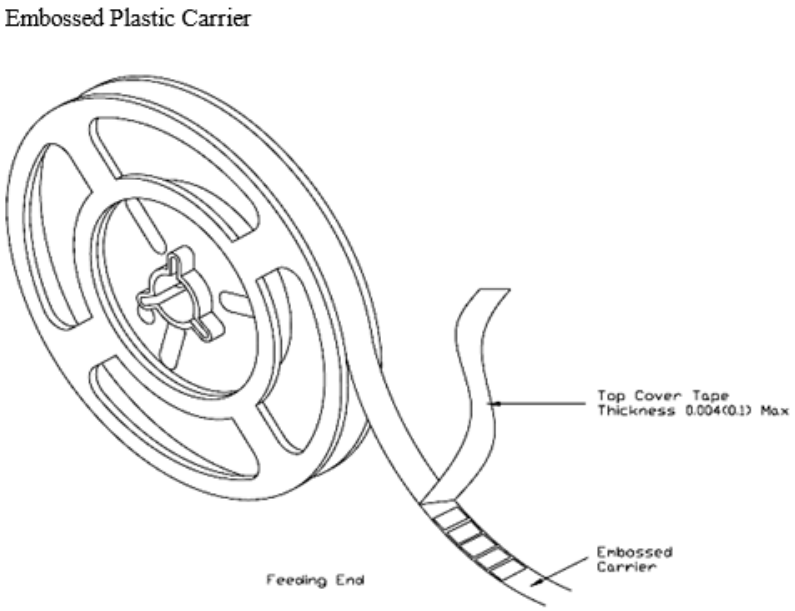


Remark: The peak temperature of soldering heat is 260 +5/-0 ℃ for 10 seconds

6.5.3 Soldering Iron: Temperature 350°C ± 10°C , dwell time shall be less than 3 sec.

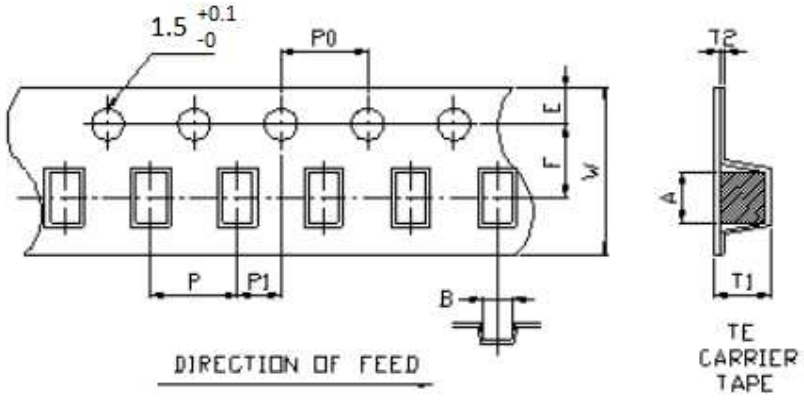
7 TAPING

7.1 Structure of Taping



7.2 Dimension

7.2.1 Dimension of Punched Paper Tape Carrier System (CPS63)



Dimension of Punched Paper Tape Carrier System (CPS – 50, 63)

Code	A	B	W	E	F	T1	T2	P	P0	P1
CPS63	6.70 ± 0.20	3.40 ± 0.20	12.00 ± 0.20	1.75 ± 0.10	5.50 ± 0.05	1.10 ± 0.15	0.23 ± 0.15	4.0 ± 0.10	4.00 ± 0.05	2.00 ± 0.05

7.2 Packaging

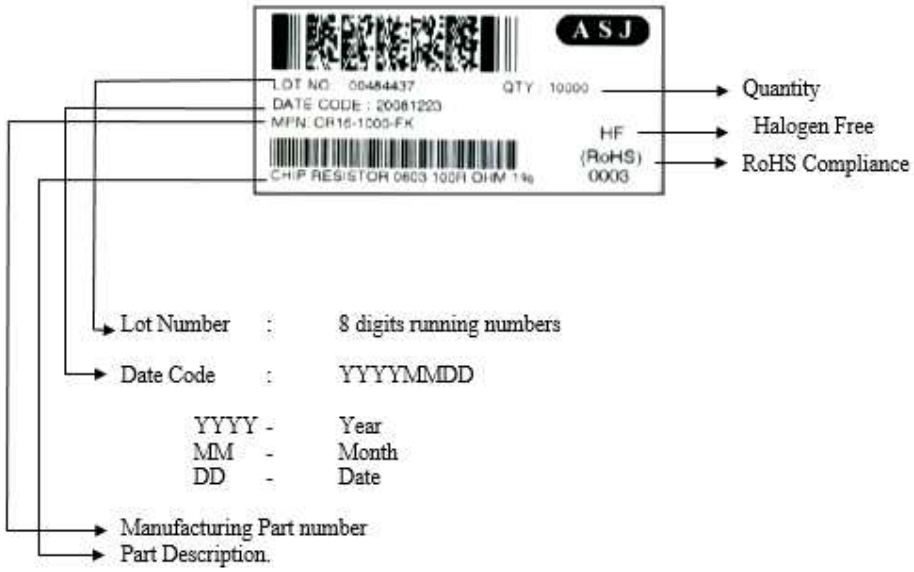
7.3.1 Taping

7.3.2 Quantity – Tape and Reels

Type	Qty(pcs/reel)	Reel	Remark
CPS63	4,000	7”	Embossed 4mm pitch

7.4 Identification

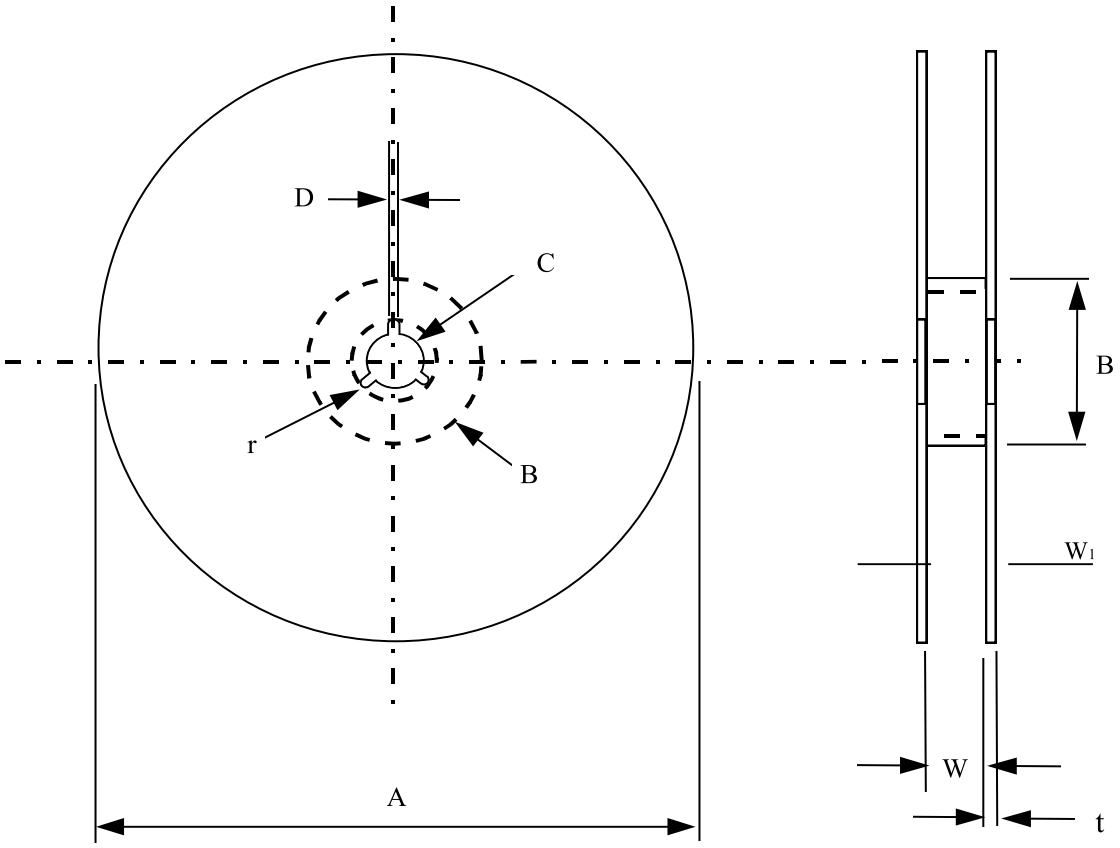
Production label that indicates the 8 digits lot number, product type, resistance value and tolerance shall be pasted on the surface of each reel.



7.4.1 Packaging Reel Box

Dimension	Reel Box	Number of Reels
185 × 60 × 186 mm	25K Box	5
185 × 120 × 186 mm	50K Box	10

7.4.2 Reel Dimensions

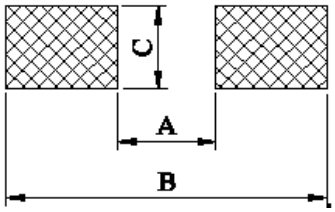


Model	A	B	C	D	W	W_1	t	r
7"Reel (5K) (except 0402 10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
7"Reel (4K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	13±1.0	14.4 max	1.2± 0.1	1.0
7''Reel (10K)	ϕ178±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 0.1	14.4 max	1.0± 0.1	1.0
10"Reel (10K)	ϕ254±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	1.5± 0.1	1.0
13"Reel (20K, 50K)	ϕ330±2.0	ϕ60min	13± 0.2	ϕ2.0± 0.5	11± 1.0	14.4 max	2.1± 0.1	-
13"Reel (20K)	ϕ330±1.0	ϕ100±1	13.5±0.5	2~3±0.5	10±0.5	-	-	-

8 SURFACE MOUNT LAND PATTERNS DESIGN (For Reflow Soldering)

When a component is soldered, the resistance after soldering changes slightly depending on the size of the soldering area and the amount of soldering. When designing a circuit, it is necessary to consider the effect of a decrease or increase in its resistance.

Unit:mm

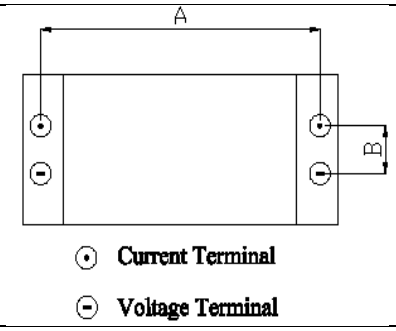


TYPE \ DIM	A	B	C
CPS63	3.8	8.0	3.5

9 MEASUREMENT POINT

Bottom electrode

Unit : mm



TYPE \ DIM	A	B
CPS63	5.90±0.05	1.60±0.05

10 REVISION HISTORY

REVISION	DATE	CHANGE NOTICE	DESCRIPTION
Version.1	19.12.2018		Initial Release
Version.2	13.10.2020		Revise clause 3.5 Storage temp. range Revise clause 3.9
Version 3	18.04.2023		Revise clause 3.8 Product Assurance