



**SYNTON-TECH CORPORATION**

**CHIP RESISTOR  
( HIGH VOLTAGE TYPE )**

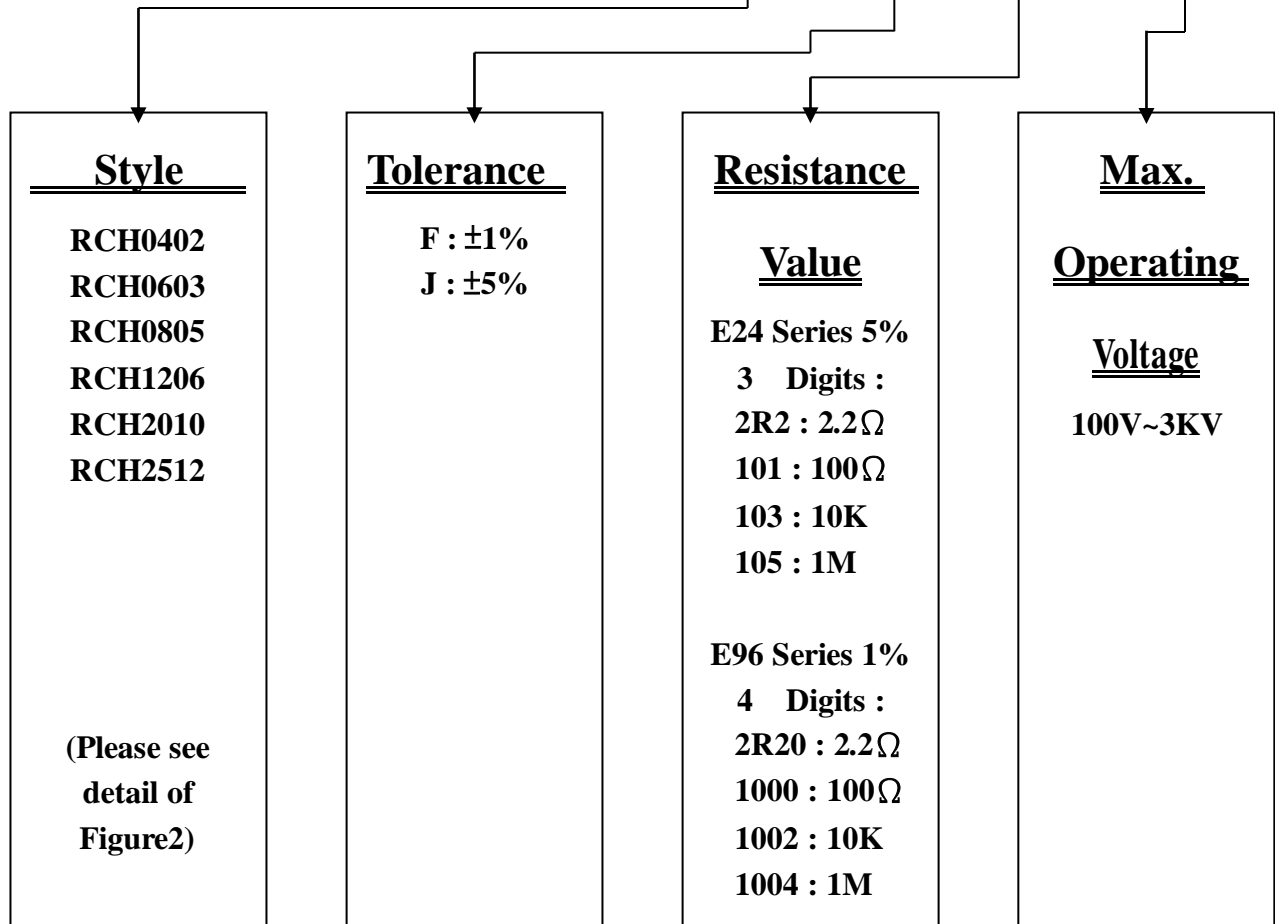
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**1. SUBJECT :** This specification applies on the chip resistors  
high voltage type was made by **SYNTON-TECH** Corporation ◦

**2. PART NUMBER :** Part number of the chip resistor is identified by the  
Style, tolerance, resistance value, voltage ◦

**Example :** **DESCRIPTION : 2010 5% 10K 2KV**

**SYNTON CODE : RCH 2010 J 103 - 2KV**



<b>APPROVED</b>	<b>CHECKED</b>	<b>DESIGNED</b>	<b>REMARK</b>	<b>DOCUMENT NO.</b>
Carol	May	Chen		0201010548



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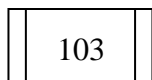
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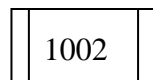
### Marking:

- (1) **5%tolerance:**3 digits, first two digits are significant figures, third digit is number of zeros. Letter R is decimal point.
- (2) **1%tolerance:**4 digits, first three digits are significant figures, fourth digit is number of zeros. Letter R is decimal point.
- (3) **\*RCH0603±1%:**E-24 marking first two digits are significant figures, third digit is number.  
**\*RCH0603±1%:**E-96 marking. (as the below list)

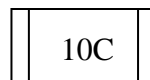
### (5) RCH0402 no marking.



5%marking  
Value=10KΩ



1%marking  
Value=10KΩ



1%marking  
Value=12.4KΩ



no marking  
RC0402

**RCH0603±1%(E-24)**

**RCH0603±1%(E-96)**

### E-96 MARKING

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

This table shows the first two digits for the three-digit EIA-96 part marking scheme.

The third character is a letter multiplier: Y=10<sup>-2</sup> X=10<sup>-1</sup> A=10<sup>0</sup> B=10<sup>1</sup> C=10<sup>2</sup> D=10<sup>3</sup> E=10<sup>4</sup> F=10<sup>5</sup>

Figure 1



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## CHIP RESISTOR ( HIGH VOLTAGE TYPE )

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### 3. ELECTRICAL CHARACTERISTICS

Item Type	Power Rating at 70°C	Operating Temp. Range	Max. Operating Voltage	Max. Overload Voltage	Resistance Range		TCR (PPM/°C)
					±1%	±5%	
RCH0402	1/16W	-55 ~ +155°C	100V	200V	39K - 1MΩ		±100
					1.02MΩ - 10MΩ	1.1MΩ - 20MΩ	±200
					-	22MΩ - 100MΩ	±400
RCH0603	1/10W		200V	400V	56K - 1MΩ		±100
					1.02MΩ - 10MΩ	1.1MΩ - 20MΩ	±200
					-	22MΩ - 100MΩ	±400
RCH0805	1/8W		400V	800V	100K - 1MΩ		±100
					1.02MΩ - 10MΩ	1.1MΩ - 20MΩ	±200
					-	22MΩ - 100MΩ	±400
RCH1206	1/4W		500V	1000V	100K - 1MΩ		±100
					1.02MΩ - 10MΩ	1.1MΩ - 20MΩ	±200
					-	22MΩ - 100MΩ	±400
		800V	1600V	100KΩ-22MΩ	100KΩ-100MΩ	±200	
RCH2010	1/2W	2000V	3000V	51K - 1MΩ		±100	
				1.02MΩ - 20MΩ	1.1MΩ - 20MΩ	±200	
				-	22MΩ - 100MΩ	±400	
RCH2512	1W	3000V	4000V	30K - 1MΩ		±100	
				1.02MΩ - 20MΩ	1.1MΩ - 20MΩ	±200	
				-	22MΩ - 100MΩ	±400	

\*Operating Voltage= $\sqrt{P \cdot R}$  or Max. operating voltage listed above, whichever is lower.

\*Overload Voltage= $2.5 \cdot \sqrt{P \cdot R}$  or Max. overload voltage listed above, whichever is lower.

Figure 2



**4. POWER RATING**

**(1)Power Derating :** The rated power at the temperature in excess of 70°C shall be derated in accordance with figure3

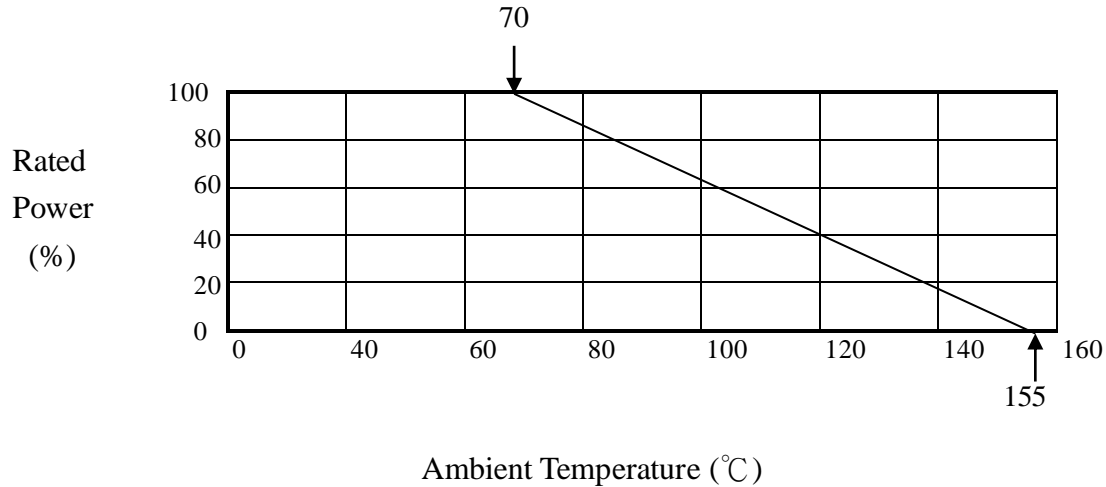


Figure3

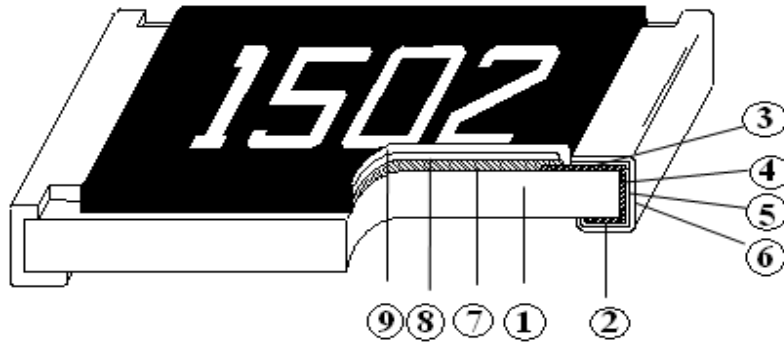
**(2)Rated Voltage :** The DC or AC(rms) continuous working voltage corresponding to the rated power is determined by the following formula:

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

Where V : Continuous rated DC or AC (rms) working voltage (v)  
P : Rated power (w)  
R : Resistance value (Ω)



**5. CONSTRUCTION AND MATERIALS**

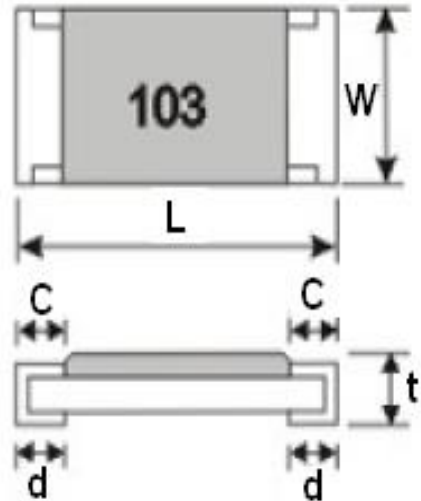
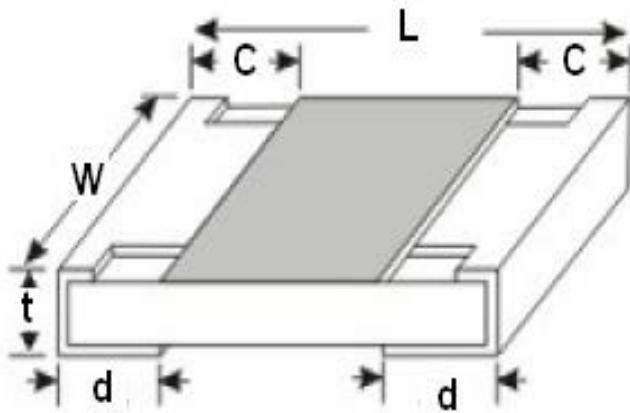


①	Alumina Substrate	④	Edge Electrode (NiCr)	⑦	Resistor Layer (RuO <sub>2</sub> /Ag)
②	Bottom Electrode (Ag)	⑤	Barrier Layer (Ni)	⑧	Primary Overcoat (Glass)
③	Top Electrode (Ag-Pd)	⑥	External Electrode (Sn)	⑨	Secondary Overcoat (Epoxy)

Figure4



**6. DIMENSIONS**



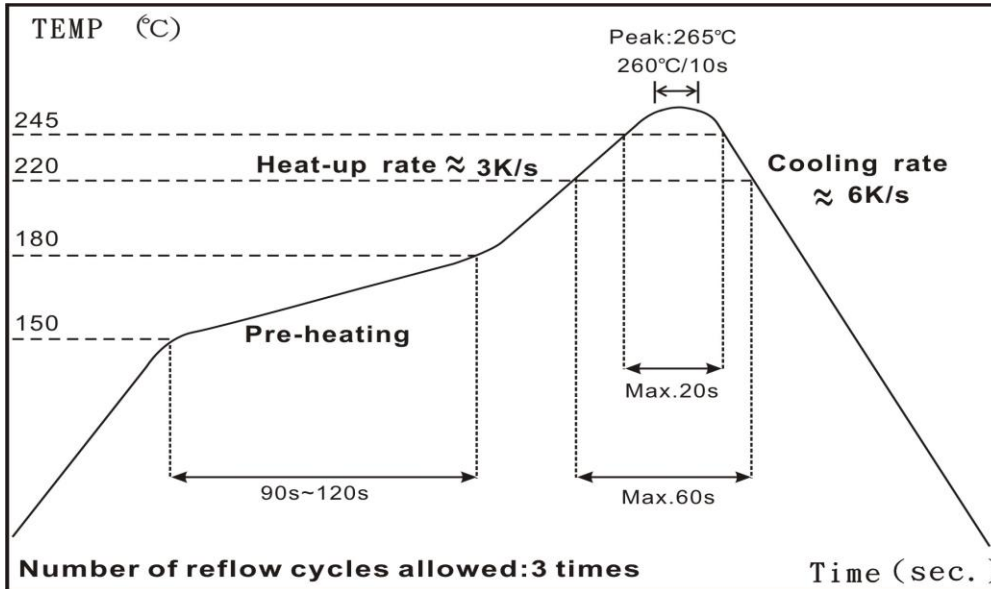
Unit:mm

TYPE	L	W	t	c	d
RCH0402	1.00±0.05	0.50±0.05	0.35±0.05	0.20±0.10	0.20±0.10
RCH0603	1.60±0.10	0.80±0.10	0.45±0.10	0.30±0.20	0.30±0.20
RCH0805	2.00±0.10	1.25±0.10	0.50±0.10	0.35±0.20	0.40±0.20
RCH1206	3.10±0.10	1.55±0.10	0.55±0.10	0.50±0.25	0.50±0.20
RCH2010	5.00±0.10	2.50±0.15	0.55±0.10	0.60±0.25	0.50±0.20
RCH2512	6.35±0.10	3.10±0.15	0.55±0.10	0.60±0.25	0.50±0.20

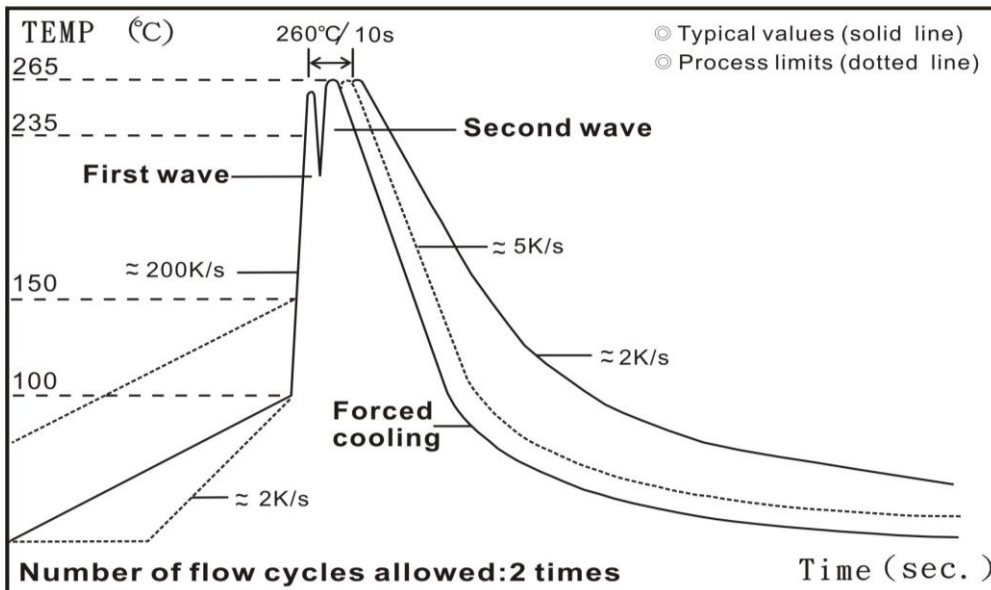
Figure5



**7. SOLDERING CONDITION**



IR Reflow Soldering



Wave Soldering  
(Flow Soldering)

- (1) Time of IR reflow soldering at maximum temperature point 260°C : 10s
- (2) Time of wave soldering at maximum temperature point 260°C : 10s
- (3) Time of soldering iron at maximum temperature point 410°C : 5s



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### 8. ENVIRONMENTAL CHARACTERISTICS

Item	Requirement		Test Method
	1%	5%	
Temperature Coefficient of Resistance (T.C.R.)	As Spec.		<b>JIS C 5201-1 4.8</b> <b>IEC 60115-1 4.8</b> -55°C~+125°C, 25°C is the reference temperature
Short Time Overload	$\pm(1.0\%+0.05\Omega)$	$\pm(2.0\%+0.05\Omega)$	<b>JIS C 5201-1 4.13</b> <b>IEC 60115-1 4.13</b> 2.5 times RCWV or Max. overload voltage for 5 seconds
Insulation Resistance	$\geq 10G$		<b>JIS C 5201-1 4.6</b> <b>IEC 60115-1 4.6</b> Max. overload voltage for 1 minute
Endurance	$\pm(2.0\%+0.10\Omega)$	$\pm(3.0\%+0.10\Omega)$	<b>JIS C 5201-1 4.25</b> <b>IEC 60115-1 4.25.1</b> 70±2°C, Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Damp Heat with Load	$\pm(2.0\%+0.10\Omega)$	$\pm(3.0\%+0.10\Omega)$	<b>JIS C 5201-1 4.24</b> 40±2°C, 90~95% R.H., Max. working voltage for 1000 hrs with 1.5 hrs "ON" and 0.5 hrs "OFF"
Dry Heat	$\pm(1.0\%+0.05\Omega)$	$\pm(1.5\%+0.10\Omega)$	<b>JIS C 5201-1 4.23.2</b> <b>IEC 60115-1 2.23.2</b> at +155°C for 1000 hrs
Bending Strength	$\pm(1.0\%+0.05\Omega)$	$\pm(1.0\%+0.05\Omega)$	<b>JIS C 5201-1 4.33</b> <b>IEC 60115-1 4.33</b> Bending once for 5 seconds with 3mm 2010 2512 sizes: 2 mm
Solderability	>95% coverage		<b>JIS C 5201-1 4.17</b> <b>IEC 60115-1 4.17</b> 245±5°C for 3 seconds
Resistance to Soldering Heat	$\pm(0.5\%+0.05\Omega)$	$\pm(1.0\%+0.05\Omega)$	<b>JIS C 5201-1 4.18</b> <b>IEC 60115-1 4.18</b> 260±5°C for 10 seconds





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Voltage Proof	No breakdown or flashover	<b>JIS C 5201-1 4.7</b> <b>IEC 60115-1 4.7</b> 1.42 times RCWV (RMS) for 1 minute
Leaching	Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$	<b>JIS C 5201-1 4.18</b> <b>IEC 60068-2-58 8.2.1</b> 260 $\pm$ 5°C for 30 seconds
Rapid Change of Temperature	$\pm(0.5\%+0.05\Omega)$ $\pm(1.0\%+0.05\Omega)$	<b>JIS C 5201-1 4.19</b> <b>IEC 60115-1 4.19</b> -55°C to +155°C, 5 cycles

\*Storage Temperature: 25 $\pm$ 3°C; Humidity < 80%RH



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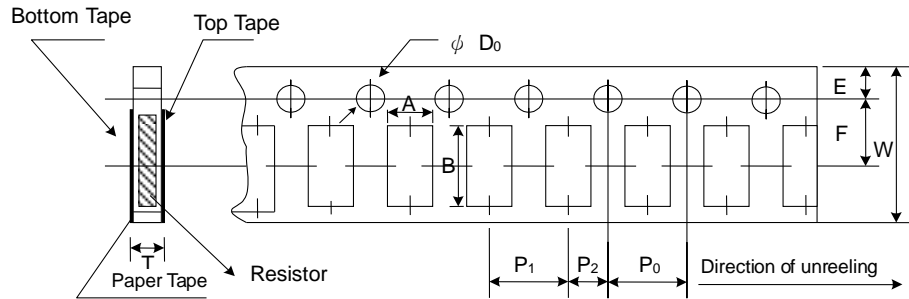
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### 8 TAPING SPECIFICATIONS

#### ● Paper Tape Specifications

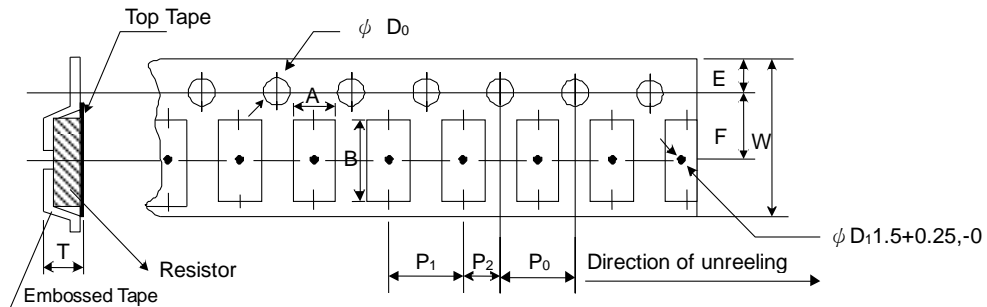


Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
RCH0402	0.65 ±0.10	1.15 ±0.1	8.0 ±0.2	1.75 ±0.1	3.50 ±0.05	4.00 ±0.10	2.00 ±0.05	2.00 ±0.05	1.50 +0.1,-0	0.45 ±0.1
RCH0603	1.10 ±0.10	1.90 ±0.1	8.0 ±0.2	1.75 ±0.1	3.50 ±0.05	4.00 ±0.10	4.00 ±0.05	2.00 ±0.05	1.50 +0.1,-0	0.70 ±0.1
RCH0805	1.60 ±0.10	2.40 ±0.2	8.0 ±0.2	1.75 ±0.1	3.50 ±0.05	4.00 ±0.10	4.00 ±0.05	2.00 ±0.05	1.50 +0.1,-0	0.85 ±0.1
RCH1206	1.90 ±0.10	3.50 ±0.2	8.0 ±0.2	1.75 ±0.1	3.50 ±0.05	4.00 ±0.10	4.00 ±0.05	2.00 ±0.05	1.50 +0.1,-0	0.85 ±0.1

Figure6

#### ● Embossed Plastic Tape Specifications



Unit: mm

Type	A	B	W	E	F	P <sub>0</sub>	P <sub>1</sub>	P <sub>2</sub>	ΦD <sub>0</sub>	T
RCH2010	2.8 ±0.10	5.5 ±0.10	12.0 ±0.3	1.75 ±0.1	5.5 ±0.05	4.00 ±0.10	4.00 ±0.1	2.00 ±0.05	1.50 +0.1,-0	1.2 <sup>+0</sup>
RCH2512	3.5 ±0.10	6.7 ±0.10	12.0 ±0.3	1.75 ±0.1	5.5 ±0.05	4.00 ±0.10	4.00 ±0.1	2.00 ±0.05	1.50 +0.1,-0	1.2 <sup>+0</sup>

Figure7



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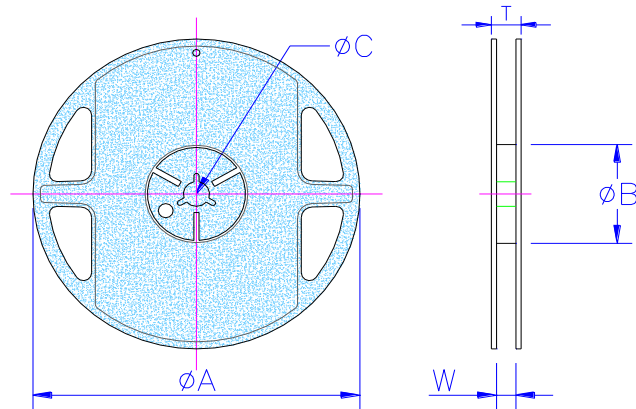
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### ● Reel Specifications & Packaging Quantity



Unit: mm

Type	Packaging Quantity		Tape Width	Reel Diameter	$\Phi A$	$\Phi B$	$\Phi C$	W	T					
RCH0402	Paper	10K	8mm	7 inch	$178.5 \pm 1.5$	$60^{+1/-0}$	$13.0 \pm 0.2$	$9.0 \pm 0.5$	$12.5 \pm 0.5$					
		20K												
		40K												
RCH0603	Paper	5K		10 inch						$254 \pm 1$	$100 \pm 0.5$	$13.0 \pm 0.2$	$9.5 \pm 0.5$	$13.5 \pm 0.5$
RCH0805		10K												
RCH1206		20K		13 inch										
RCH2010	Embossed	4K	12mm	7 inch	$178.5 \pm 1.5$	$60^{+1/-0}$	$13.0 \pm 0.5$	$13.0 \pm 0.5$	$15.5 \pm 0.5$					
RCH2512		8K		10 inch						$250 \pm 1$	$62 \pm 0.5$	$13.0 \pm 0.5$	$12.5 \pm 0.5$	$16.5 \pm 0.5$

Figure8