

# THIN FILM CHIP RESISTORS

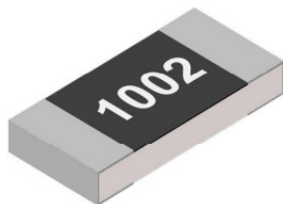
## (RMT/RPT/RPTH SERIES)

### Applications

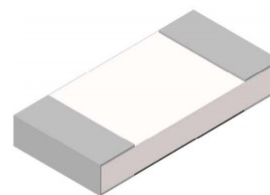
- Computer & relative products
- Communication devices
- Measuring instrument
- Converters
- Printing equipment

### Features

- Tolerance to  $\pm 0.1\%$
- Low TCR to  $\pm 10\text{ppm}/^\circ\text{C}$
- Down size to 0201
- Halogen free and lead free
- RoHS compliant

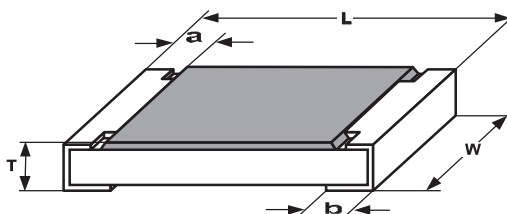


Top view



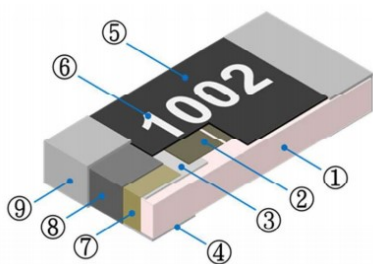
Bottom view

### Dimensional Specifications



STYLE			Size code	Dimensions : mm				
				L	W	T	a	b
RMT-02/RPT-02			0201	0.60 $\pm$ 0.05	0.30 $\pm$ 0.05	0.23 $\pm$ 0.05	0.12 $\pm$ 0.05	0.15 $\pm$ 0.05
RMT-04	RPT-04	RPTH-04	0402	1.00 $\pm$ 0.10	0.50 $\pm$ 0.05	0.30 $\pm$ 0.05	0.20 $\pm$ 0.10	0.20 $\pm$ 0.10
RMT-06	RPT-06	RPTH-06	0603	1.60 $\pm$ 0.10	0.80 $\pm$ 0.10	0.45 $\pm$ 0.10	0.30 $\pm$ 0.20	0.30 $\pm$ 0.20
RMT-10	RPT-10	RPTH-10	0805	2.00 $\pm$ 0.15	1.25 $\pm$ 0.15	0.55 $\pm$ 0.10	0.35 $\pm$ 0.20	0.40 $\pm$ 0.20
RMT-18	RPT-18	RPTH-18	1206	3.10 $\pm$ 0.15	1.60 $\pm$ 0.15	0.55 $\pm$ 0.10	0.45 $\pm$ 0.20	0.50 $\pm$ 0.20
RMT-20	RPT-20	RPTH-20	1210	3.10 $\pm$ 0.15	2.50 $\pm$ 0.15	0.55 $\pm$ 0.10	0.45 $\pm$ 0.20	0.50 $\pm$ 0.20
RMT-22	RPT-22	RPTH-22	2010	5.00 $\pm$ 0.15	2.50 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.20	0.60 $\pm$ 0.20
RMT-24	RPT-24	RPTH-24	2512	6.30 $\pm$ 0.15	3.20 $\pm$ 0.15	0.55 $\pm$ 0.10	0.60 $\pm$ 0.20	0.60 $\pm$ 0.20

### Construction



①	Alumina Substrate	④	Bottom Inner Electrode	⑦	Side Inner Electrode
②	Resistive Layer	⑤	Protective Overcoat	⑧	Nickel Barrier
③	Top Inner Electrode	⑥	Marking	⑨	Solder coating (Sn)



## Standard Electrical Specifications

### RMT SERIES Thin film standard type

Type	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	Resistance value				T.C.R ppm/°C
				±0.1%(B)	±0.25%(C)	±0.5%(D)	±1.0%(F)	
RMT-02/0201	1/32W	15V	30V	22Ω ~ 75KΩ				±25(E) ±50(C)
RMT-04/0402	1/16W	50V	100V	4.7Ω ~ 220KΩ		2.49Ω ~ 220KΩ		
RMT-06/0603	1/16W	50V	100V	4.7Ω ~ 680KΩ		2.49Ω ~ 680KΩ		
RMT-10/0805	1/10W	100V	200V	4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		
RMT-18/1206	1/8W	150V	300V	4.7Ω ~ 1.5MΩ		2.49Ω ~ 1.5MΩ		
RMT-20/1210	1/4W			4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		
RMT-22/2010	1/4W			4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		
RMT-24/2512	1/2W			4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		

- For non standard parts, please contact our sales dept.

- Operating Temperature Range: -55°C ~ +155°C

### RPT SERIES Thin film high power type

Type	Rated Power at 70°C	Max Working Voltage	Max Overload Voltage	Resistance value				T.C.R ppm/°C
				±0.1%(B)	±0.25%(C)	±0.5%(D)	±1.0%(F)	
RPT-02/0201	1/20W	25V	50V	22Ω ~ 5KΩ				±10(T)/±15(H)
				22Ω ~ 75KΩ				±25(E)/±50(C)
RPT-04/0402	1/16W	50V	100V	10Ω ~ 68KΩ				±10(T)/±15(H)
				4.7Ω ~ 220KΩ		2.49Ω ~ 220KΩ		±25(E)/±50(C)
RPT-06/0603	1/10W	75V	150V	10Ω ~ 332KΩ				±10(T)/±15(H)
				4.7Ω ~ 680KΩ		2.49Ω ~ 680KΩ		±25(E)/±50(C)
RPT-10/0805	1/8W	100V	200V	10Ω ~ 680KΩ				±10(T)/±15(H)
				4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		±25(E)/±50(C)
RPT-18/1206	1/4W	200V	400V	10Ω ~ 1MΩ				±10(T)/±15(H)
RPT-20/1210	1/4W			4.7Ω ~ 1.5MΩ		2.49Ω ~ 1.5MΩ		±25(E)/±50(C)
				10Ω ~ 1MΩ				±10(T)/±15(H)
RPT-22/2010	1/2W			4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		±25(E)/±50(C)
				10Ω ~ 1MΩ				±10(T)/±15(H)
RPT-24/2512	3/4W			4.7Ω ~ 1MΩ		2.49Ω ~ 1MΩ		±25(E)/±50(C)
				10Ω ~ 1MΩ				±10(T)/±15(H)

- For non standard parts, please contact our sales dept.

- Operating Temperature Range: -55°C ~ +155°C

### RPTH SERIES Thin film ultra high power type

Type	Rated Power at	Max Working Voltage	Max Overload Voltage	Resistance value				T.C.R ppm/°C
				±0.1%(B)	±0.25%(C)	±0.5%(D)	±1.0%(F)	
RPTH-04/0402	1/10W	50V	100V	10Ω ~ 10KΩ				±10(T) ±15(H) ±25(E) ±50(C)
RPTH-06/0603	1/6W	100V	150V	10Ω ~ 47KΩ				
RPTH-10/0805	1/4W	150V	300V	10Ω ~ 100KΩ				
RPTH-18/1206	1/3W	200V	400V	10Ω ~ 100KΩ				
RPTH-20/1210	1/3W			10Ω ~ 100KΩ				
RPTH-22/2010	1/2W			10Ω ~ 100KΩ				
RPTH-24/2512	1W			10Ω ~ 100KΩ				

- For non standard parts, please contact our sales dept.

- Operating Temperature Range: -55°C ~ +155°C

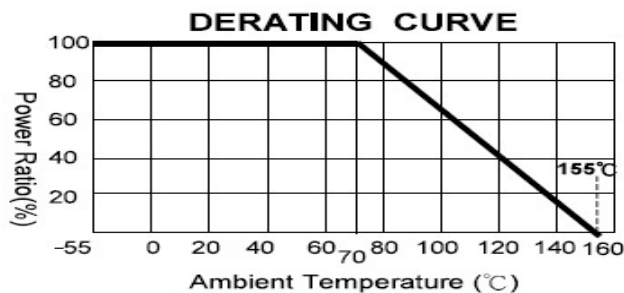


## Reliability Test and Requirement

Test Item	Test Method	Procedure	Requirements
Temperature Coefficient of	JIS- C- 5201-1 4.8 IEC-60115-1 4.8	At 25 / -55°C and 25°C / +125°C, 25°C is the reference temperature	Refer to Standard Electrical Specifications
Short Time Overload	JIS- C- 5201-1 4.13 IEC-60115-1	2.5 times RCWV or Max. Overload voltage whichever is less for 5 seconds.	±(0.5%+ 0.05Ω) No Visual damage
Insulation Resistance	JIS -C- 5201-1 4.6 IEC-60115-1 4.6	Apply 100VDC for 1 minute.	≥10GΩ
Solderability	JIS- C- 5201-1 4.17 IEC-60115-1	245±5°C for 3 seconds.	>95% Coverage No Visual damage
Resistance to Soldering Heat	JIS -C- 5201-1 4.18 IEC-60115-1 4.18	260 ± 5°C for 10 seconds.	±(0.5%+ 0.05Ω) No Visual damage
Leaching	JIS- C- 5201-1 4.18 IEC-60068-2- 58 8.2.1	260 ± 5°C for 30 seconds.	>95% Coverage No Visual damage
Rapid Change of Temperature	JIS -C- 5201-1 4.19 IEC-60115-1 4.19	-55°C to +155°C, 300 cycles	±(0.5%+ 0.05Ω) No Visual damage
High Temperature Exposure	JIS -C- 5201-1 4.25 IEC-60068-2-2	At 155 ±5°C for 1000 +48/-0 hours	±(0.5%+0.05Ω)
Resistance to Solvent	JIS -C- 5201-1 4.29	The tested resistor be immersed into isopropyl alcohol of 20~25 °C for 60 secs. Then the resistor is left in the room for 48 hrs.	±(0.5%+ 0.05Ω) No Visual damage
Damp Heat with Load	JIS -C- 5201-1 4.24 IEC-60115-1 4.24	40 ±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 hr "OFF"	±(0.5%+ 0.05Ω)
Biased Humidity	MIL-STD-202 Method 103	1,000 hours; 85°C/85% RH, 10% of operationing power. Measurement at 24±4 hours after test conclusion	±(0.5%+ 0.05Ω)
Load Life (Endurance)	JIS -C- 5201-1 4.25 IEC-60115-1	70 ±2°C, RCWV or Max.working voltage whichever is less for 1000 hrs with 1.5 hrs "ON" and 0.5 hr "OFF"	±(0.5%+ 0.05Ω)
Bending Strength	JIS -C- 5201-1 4.33 IEC-60115-1 4.33	Bending once for 5 seconds D: 0201、0402、0603、0805= 5mm 1206、1210= 3mm 2010、2512 =2mm	±(0.5%+ 0.05Ω) No Visual damage

• We can also provide AEC-Q200 test reports if required by customers.

## Derating Curve



Power 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.

### \* Rate voltage

Resistance range:  $\geq 1\Omega$

Rated voltage: The resistor shall have a DC continuous working voltage or a RMS AC(ms) 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)

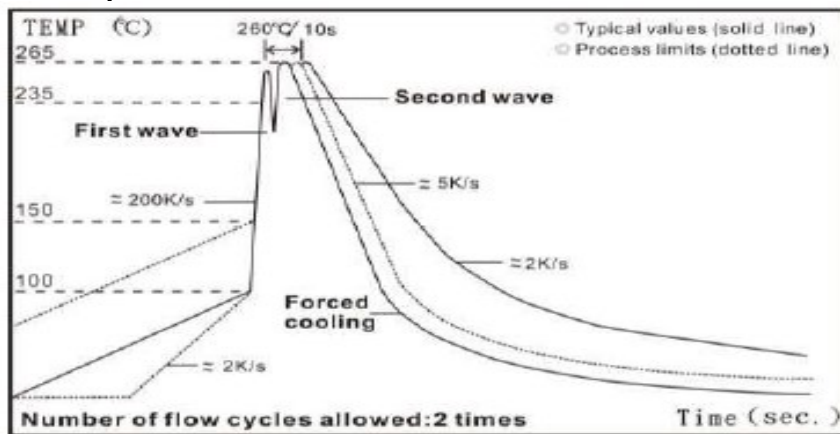
P=Power rating(W)

R=Nominal resistance(Ω)

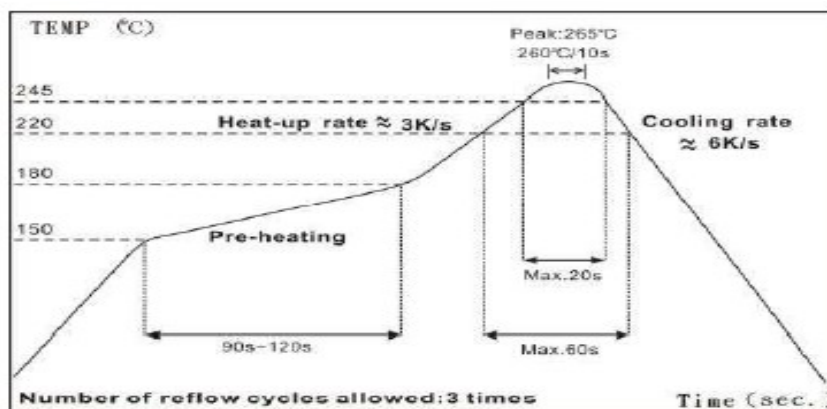


## Recommended Customer Soldering Parameters

### \* Wave solder Temperature condition



### \* Solder reflow Temperature condition



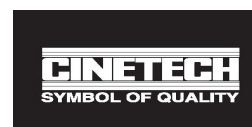
\* Rework temperature (hot air equipment): 350°C, 3~5seconds

### \* Recommended reflow methods

- IR, vapor phase oven, hot air oven
- If reflow temperatures exceed the recommended profile, devices may not meet the performance requirements.

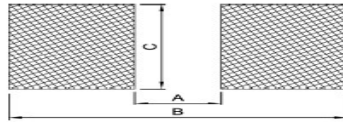
## Parts Number System

RPT -	18 -	1004	C	R	E
<b>Type</b>	<b>Size</b>	<b>Resistance</b>	<b>Tolerance</b>	<b>Standard Packing</b>	<b>TCR/ppm°C</b>
RMT/ RPT / RPTH Series Thin Film Chip Resistor	02=0201 04=0402 06=0603 10=0805 18=1206 20=1210 22=2010 24=2512	0R = 0R00 1R = 1R00 9R7 = 9R70 10R = 10R0 100R = 1000 1KR = 1001 1MR = 1004	B = ±0.1% C = ±0.25% D = ±0.5% F = ±1%	R=Paper tape reel  K=Embossed plastic tape reel	T= ±10ppm H= ±15ppm E= ±25ppm C= ±50ppm



## General information

### \* Recommend Land Pattern Design



Type	0201	0402	0603	0805	1206	1210	2010	2512
A	0.25	0.50	0.85	1.30	2.20	2.00	3.80	4.90
B	0.85	1.60	2.40	2.90	4.20	4.40	6.60	8.10
C	0.35	0.70	1.00	1.40	1.70	2.70	2.70	3.40

## Marking

### \* 0201 & 0402 no marking



RMT/RPT-02(0201)  
RMT/RPT/RPTH-04(0402)

### \* 4 digits code for 0805 ~ 2512 type

- First three digits are significant figure,
- Forth digit is number of zeros.
- Letter R is decimal point.



Value=10K $\Omega$

RMT/RPT/RPTH-10(0805)  
RMT/RPT/RPTH-18(1206)  
RMT/RPT/RPTH-20(1210)  
RMT/RPT/RPTH-22(2010)  
RMT/RPT/RPTH-24(2512)

EX: 120K, the marking code is 1203 in E24

121K, The marking code is 1213 in E96

### \* 0603 1%: EIA-96 Marking. Please refer to data form as below:



RMT/RPT/RPTH-06(0603)  
1%marking --> Value=12.4K $\Omega$

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

$Y=10^{-2}$   $X=10^{-1}$   $A=10^0$   $B=10^1$   $C=10^2$   $D=10^3$   $E=10^4$   $F=10^5$

### \* E24 & E96 data form

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

