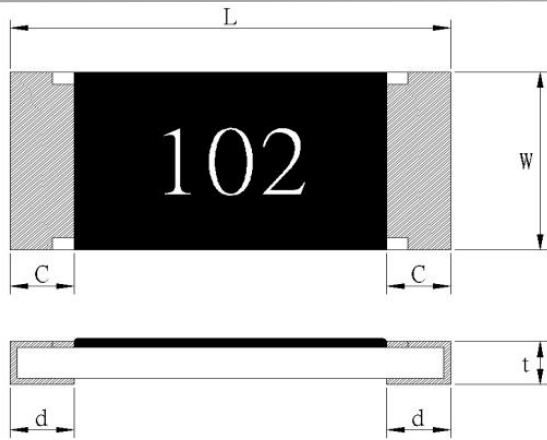


**FEATURES**

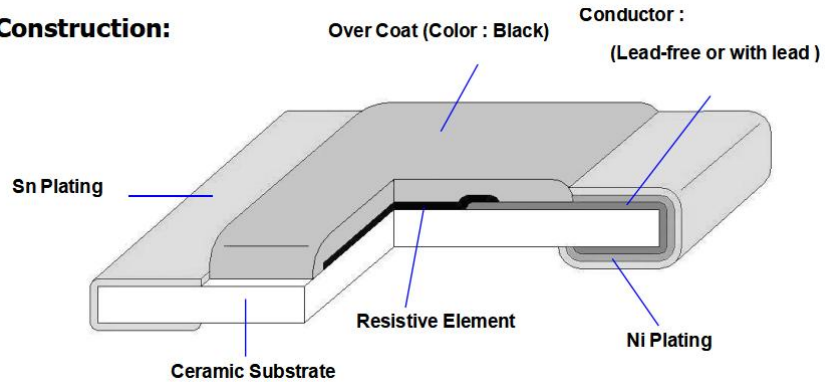
- Excellent characteristics in resistance tolerance, temperature coefficient.
- Exceptional long term stability.
- Size : 0201/0402/0603/0805/1206/1210/1218/2010/2512
- Standard tolerance:  $\pm 0.1\%$ ,  $\pm 0.5\%$ ,  $\pm 1\%$ ,  $\pm 2\%$ ,  $\pm 5\%$
- standard thick film chip resistors are the perfect choice for most fields of modern electronics where high reliability and stability are of major concern. Typical applications include automotive, telecommunications, and industrial.



**DRAWING and DIMENSIONS (mm)**



**Construction:**



Size	Power Rating at 70°C	L	W	C	d	t
2010	1/20W	0.60±0.03	0.30±0.03	0.1±0.05	0.15±0.05	0.25±0.05
0402	1/16W	1.00 <sup>+0.1</sup> <sub>-0.05</sub>	0.50±0.05	0.20±0.10	0.25±0.10	0.35±0.05
0603	1/10W	1.60±0.10	0.80±0.10	0.30±0.20	0.30 <sup>+0.2</sup> <sub>-0.1</sub>	0.45±0.10
0805	1/8W	2.00±0.10	1.25±0.10	0.40±0.20	0.40±0.20	0.50±0.10
1206	1/4W	3.10±0.10	1.55±0.10	0.50±0.30	0.40±0.20	0.60±0.10
1210	1/3W	3.10±0.10	2.55±0.10	0.50±0.30	0.40±0.20	0.60±0.10
2010	1/2W	5.00±0.15	2.50±0.15	0.60±0.30	0.50±0.25	0.60±0.10
2512	1 W	6.30±0.20	3.20±0.20	0.60±0.30	0.50±0.25	0.60±0.10



**SPECIFICATIONS**

Type	Power Rating at 70°C	Rating Voltage	Max. Working Voltage	Max. Over- Load Voltage	T.C.R (PPM/°C)	Resistance Range(Ω)				
						B(±0.1%)E-96	D(±0.5%)E-96	F(±1%)E-96	G(±2%)E-24	J(±5%)E-24
2010	1/20W	Refer 5.2	25V	50V	±200			10Ω-1MΩ	10Ω-1MΩ	10Ω-10MΩ
					+600 -200					1-9.1Ω
0402	1/16W	Refer 5.2	50V	100V	±200	10Ω-200kΩ	10Ω-1MΩ	10Ω-10MΩ	10Ω-10MΩ	10Ω-10MΩ
					+500 -200			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω
					±400			10MΩ ≧ R ≧ 20MΩ	10MΩ ≧ R ≧ 20MΩ	10MΩ ≧ R ≧ 20MΩ
0603	1/10W	Refer 5.2	50V	100V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ
0805	1/8W	Refer 5.2	150V	300V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ
1206	1/4W	Refer 5.2	200V	400V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ
1210	1/3W	Refer 5.2	200V	400V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ
2010	1/2W	Refer 5.2	200V	400V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ
2512	1W	Refer 5.2	200V	400V	±100	10Ω-560kΩ	10Ω-1MΩ	10Ω-1MΩ		
					±200			1M<R ≧ 10MΩ	10Ω-10MΩ	10Ω-10MΩ
					±400			1Ω-9.1Ω	1Ω-9.1Ω	1-9.1Ω 10M<R ≧ 20MΩ

**Ω THICK FILM CHIP RESISTORS**

Type /Code	Rated Current	Max Overload Current	Resistance Range
2010(RM02)	0.5A	1A	50mΩ MAX
0402(RM04)	1A	2.5A	50mΩ MAX
0603(RM06)	1A	2.5A	50mΩ MAX
0805(RM10)	2A	5A	50mΩ MAX
1206(RM12)	2A	5A	50mΩ MAX
1210(RM13)	2A	5A	50mΩ MAX
2010(RM20)	2A	5A	50mΩ MAX
2512(RM25)	2A	5A	50mΩ MAX

2. Operating Temp(°C): -55°C ~ +125°C



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### 5.1 Derating Curve :

For resistors operated at ambient temperature over 70°C , power rating shall be derated in accordance with figure 1.

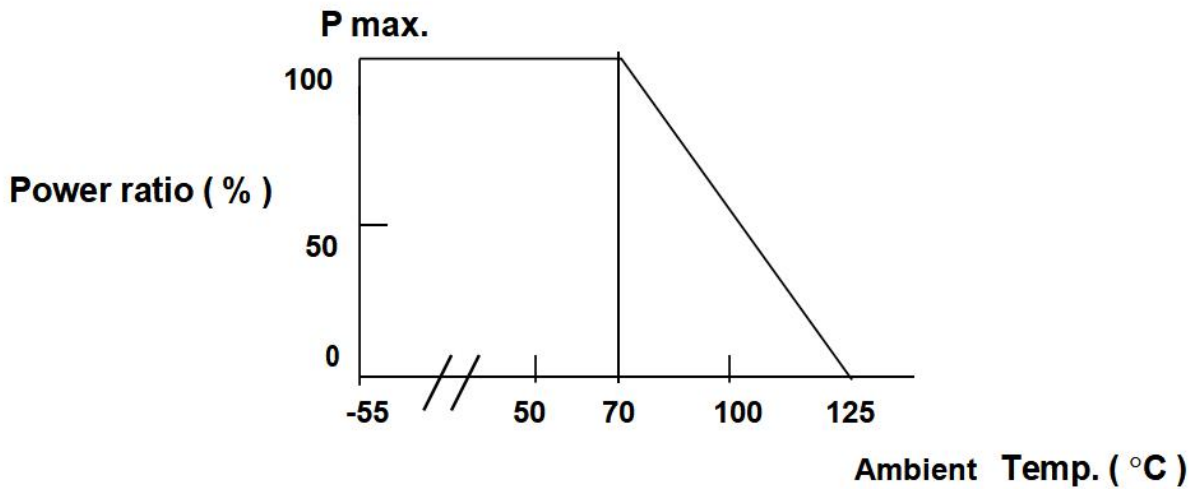


Figure 1

### 5.2 Rated Voltage:

The rated voltage is calculated by the following formula:

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

E=Rated Voltage(V)

P=Rated Power(W)

R=Resistance Value(Ω)

E.G. : What is RM06JTN102 the rated voltage ?

RM06JTN102 P:1/10W ; R:102 = 1KΩ = 1000Ω

$$E = \sqrt{0.1(W) * 1000(\Omega)} = 10 (V)$$



**6. Reliability Tests: (As specified in JIS C 5202)**

Test Items	Reference standard	Condition of Test	Test Limits
Temperature Resistance Coefficient of	JIS-C5202-5.2	-55 ~ +125 °C	Refer 5.0
Short Time Overload	JIS-C5202-5.5	2.5 X rated voltage for 5 sec	±(1% + 0.05Ω) Remarks : 0201 : ±(3% + 0.1Ω) 0402 : ±(2% + 0.1Ω) 0Ω : 50mΩ or less
Intermittent Overload	JIS-C5202-5.8	3.0 X rated voltage or Max Overloading voltage ,1sec "ON" , 25sec "OFF" , 10000 cycles(Remarks : 0201 / 0402 2.5 X RCWV * )	± (5.0% + 0.1Ω) 0Ω : 50mΩ or less
Load Life	JIS-C5202-7.10	1000 hours at rated voltage, 70°C , 1.5hours"ON " , 0.5hour "OFF"	0.5%,1%:±(1.0%+0.05Ω) 2%,5%:±(3.0%+0.1Ω) Remarks : 0201 : ±(5.0%+0.1Ω) 0402 : ±(3.0%+0.1Ω) 0Ω : 100mΩ or less
Load Life with Humidity	JIS-C5202-7.9	1000 hours at rated voltage , 40±2°C , 90~95% RH 1.5hours "ON " , 0.5hour "OFF"	0.5%,1%:±(1.0%+0.05Ω) 2% , 5%:±(3.0%+0.1Ω) Remarks : 0201: ±(5.0%+0.1Ω) 0402: ±(3.0%+0.1Ω) 0Ω : 100mΩ or less Without mechanical damage
Rapid Change of Temperature	JIS-C5202-7.4	-55°C (30 min. ) / +155 °C(30 min. ) 5 cycles	0.5%,1%:±(0.5%+0.05Ω) 2% , 5%:±(1.0%+0.05Ω) Remarks : 0201: ±(3.0%+0.1Ω) 0Ω : 50mΩ or less
Solderability	JIS-C5202-6.11	245±5°C solder, 2±0.5 sec dwell. Solder : Sn96.5 / Ag3.0 / Cu0.5	At least 95% of surface area of electrode shall be covered with new solder.
Robustness of Termination (Bending)	JIS-C5202—6.1	3mm deflection	0.5%,1%:±(0.5%+0.05Ω) 2%,5%:±(1.0%+0.05Ω) Remarks : 0201 ±(1.0%+0.1Ω) 0Ω: 50mΩ or less
Dielectric Withstanding Voltage (Voltage Proof)	JIS-C5202-5.7	Applying voltage : 0201 : 50V , 0402 & 0603 : 300V 500V for a minute . The other	No abnormalities such as flashover, burning dielectric breakdown shall appear.
Insulation Resistance	JIS-C5202-5.6	Applying voltage 100V for 1 minute. Remark : 0201 50V	≧ 1GΩ
Resistance to Dry Heat	JIS-C5202-7.2	125±5°C for 96±4Hrs	0.5%,1%:±(1.0%+0.05Ω) 2%,5%:±(2.0%+0.1Ω) Remark 0201 : ±(2.0%+0.1Ω) 0Ω: 50mΩ or less
Resistance to Solder Heat	JIS-C5202-6.10	270 ±5°C solder , 10 ±1 sec dwell .	0.5%,1%:±(0.5%+0.05Ω) 2% , 5%:±(1.0%+0.05Ω) Remarks : 0201 ±(3.0%+0.1Ω) 0Ω: 50mΩ or less





Whisker	SONY SS-00254-8	Component , Lead-Free Soldering part 8 : Solder Heat Resistance Test for SMD. Lead-Free Soldering ”  Temp. Cycles : -35 ± 5°C / 125 ± 5°C , Keep 7 min Testing duration : 500±4 hours  Temp. Humidity Chambers: Temperature : 85°C Humidity : 85% RH Testing duration : 500±4 hours .	Whisker formation :50 um or less .
Resistance to Solder Heat	SONY SS-00254-5	Component , Lead-Free Soldering part 5 : Solder Heat Resistance Test for SMD. Lead-Free Soldering ”  Flow Solder : Pre – heat : 100 to 105 °C 30±5 sec Temperature : 260±3°C 10 +1/ -0 sec The entire sample shall be dipped in solder.The specimen shall be stored at standard atmospheric conditions for 1 hour .  Iron Solder : Bit temperature : 350 ±10°C Application time of soldering iron : 3 +1/- 0sec Apply the soldering iron to the electrode . The specimen shall be stored at standard atmospheric conditions for 1 hour , after which the measurements shall be made	Electrical characteristics shall be Satisfied . Without distinct deformation in appearance

## 7. Marking

### 7.1 ±2% & ±5%(E24) : RM06 / RM10 / RM12 / RM13 / RM20 / RM25

Resistance value is expressed by 3 digits, the first two digits represent the significant figures of nominal resistance value in  $\Omega$  , and the third digit represents exponent for base of 10.

E.G. : , 102 =  $10 \times 10^2 = 1000 \Omega = 1K \Omega$



### 7.2 0.1% , 0.5% , ±1% (E96) : RM10 / RM12 / RM13 / RM20 / RM25

Resistance value is expressed by 4 digits or 3digits , the first three digits represent the significant figures of nominal resistance value in  $\Omega$  , and the fourth digit represents exponent for base of 10.

E.G. : 1000 =  $100 \times 10^0 = 100 \Omega$



**7.3 0.1% , 0.5% , ±1% ( E96): RM06**

When the marking space is too small in such small-sized resistors as RM06, the marking can not made by 4 digits and may be made by two digits combined with one English capital.

**Symbol for E96 series nominal resistance value**

Symbol	E96	Symbol	E96	Symbol	E96	Symbol	E96
01	100	25	178	49	316	73	562
02	102	26	182	50	324	74	576
03	105	27	187	51	332	75	590
04	107	28	191	52	340	76	604
05	110	29	196	53	348	77	619
06	113	30	200	54	357	78	634
07	115	31	205	55	365	79	649
08	118	32	210	56	374	80	665
09	121	33	215	57	383	81	681
10	124	34	221	58	392	82	698
11	127	35	226	59	402	83	715
12	130	36	232	60	412	84	732
13	133	37	237	61	422	85	750
14	137	38	243	62	432	86	768
15	140	39	249	63	442	87	787
16	143	40	255	64	453	88	806
17	147	41	261	65	464	89	825
18	150	42	267	66	475	90	845
19	154	43	274	67	487	91	866
20	158	44	280	68	499	92	887
21	162	45	287	69	511	93	909
22	165	46	294	70	523	94	931
23	169	47	301	71	536	95	953
24	174	48	309	72	549	96	976

**Symbol for multipliers**

Symbol	A	B	C	D	E	F	G	H	X	Y	Z
multipliers	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>8</sup>	10 <sup>9</sup>	10 <sup>10</sup>

E.G : 01A = 100 × 10<sup>0</sup> = 100 Ω



**Notes :**

When the resistance value is not in the list of E96 , 3 digital with underline in E-24 series is used as mark .

E.G. : 0603 , 120 Ω , 1% Marking is 121

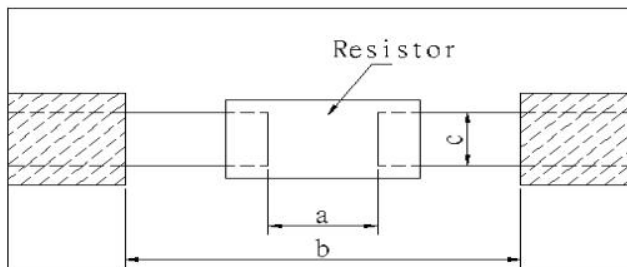


**7.4 ±1%( E96/3digitals)**

The resistance value by 3 digits is requirement for customer.

**7.5 No Marking for RM02 & RM04**

**10. Recommended land patterns :**



Land pattern		Dimension ( mm )		
Type	Size	a	b	c
RM	02 (0201 )	0.25~0.3	0.7~0.9	0.3~0.4
RM	04 (0402 )	0.50~0.6	1.4~1.6	0.4~0.6
RM	06 (0603 )	0.7~0.9	2.0~2.2	0.8~1.0
RM	10 (0805 )	1.0~1.4	3.2~3.8	0.9~1.4
RM	12 (1206 )	2.0~2.4	4.4~5.0	1.2~1.8
RM	13 (1210 )	2.0~2.4	4.4~5.0	2.3~3.5
RM	20 (2010 )	3.3~3.7	5.7~6.5	2.3~3.5
RM	25 (2512 )	3.6~4.0	7.6~8.6	2.3~3.5





**PN Structure**

WRM	1026	1W	103	J	A	R
Series	Type Code 1.	Rated Power(W) 2.	Resistance Value ( $\Omega$ ) 3.	Resistance Tolerance 4	Packing 5.	Pb 6

**1, Type Code**

Size	2010	0402	0603	0805	1206	1210	2010	2512
Code	RM02	RM04	RM06	RM10	RM12	RM13	RM20	RM25

**2, Power (W)**

Code	2010	0402	0603	0805	1206	1210	2010	2512
Power (W)	1/20W	1/16W	1/10W	1/8W	1/4W	1/3W	1/2W	1W

**3, Resistance Value ( $\Omega$ )**

Code	103	0	1540	43R2
Resistance( $\Omega$ )	10k $\Omega$	0 $\Omega$	154 $\Omega$	43.2 $\Omega$

3 digits, e.g.,:(E-24) 103 = 10k $\Omega$ , 0 = 0 $\Omega$

4 digits, e.g., :(E-96) 1540 = 154 $\Omega$ , 43R2 = 43.2 $\Omega$

**4, Resistance Tolerance**

Code	B	D	F	G	J
Tolerance	$\pm 0.1\%$	$\pm 0.5\%$	$\pm 1\%$	$\pm 2\%$	$\pm 5\%$

**5, Packing**

Code	A	B
Packing	Ammo Reel	Bulk

**6,Pb**

Code	R
Pb	RoHS

**Note: Other resistance is available on request. WEET is capable of doing custom service for you.**



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