



# Thick Film Chip Resistors ( Lead-Free for RM series standard ) Halogen-Free

|              |              |
|--------------|--------------|
| Document No. | TRM-XX0S002I |
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## 1. Scope :

This specification applies for the RM series of thick film chip resistors made by TA-I.

## 2. Construction :



## 3. Type Designation :

|                    |                  |                 |                  |                    |
|--------------------|------------------|-----------------|------------------|--------------------|
| <b><u>RM</u></b>   | <b><u>10</u></b> | <b><u>J</u></b> | <b><u>TN</u></b> | <b><u>103</u></b>  |
| Product Code       | Size             | Tolerance       | Packaging        | Nominal Resistance |
| RM : Chip Resistor | Power Rating     |                 |                  |                    |

|  |   |   |  |
|--|---|---|--|
| 01-01005(0402) 1/32W<br>02-0201(0603) 1/20W<br>04-0402(1005) 1/16W<br>06-0603(1608) 1/10W<br>10-0805(2012) 1/8W<br>12-1206(3216) 1/4W<br>13-1210(3226) 1/3W<br>20-2010(5025) 3/4W<br>25-2512(6432) 1 W | J-±5%<br>G-±2%<br>F-±1%<br>D-±0.5%<br>B-±0.1% | T-Paper Tape<br>E-Embossed Tape<br><hr/> +N : Lead-Free | 3 digits, e.g.,:<br>(E-24) 103 = 10kΩ<br>0 = 0Ω<br>4 digits, e.g., :<br>(E-96) 1540 = 154Ω<br>43R2 = 43.2Ω |
|--|---|---|--|



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**4. Dimensions :**



UNIT: mm

| Type | L   | W         | C         | d  | t          |
|------|---|-----------|-----------|--|------------|
| RM01 | 0.4 ±0.02                                   | 0.2 ±0.02 | 0.1 ±0.03 | 0.1±0.03                                   | 0.13 ±0.02 |
| RM02 | 0.60±0.03                                   | 0.30±0.03 | 0.1±0.05  | 0.15±0.05                                  | 0.23±0.03  |
| RM04 | <sup>+0.1</sup><br>1.00<br><sub>-0.05</sub> | 0.50±0.05 | 0.20±0.10 | 0.25±0.10                                  | 0.32±0.05  |
| RM06 | 1.60±0.10                                   | 0.80±0.10 | 0.30±0.20 | <sup>+0.2</sup><br>0.30<br><sub>-0.1</sub> | 0.45±0.10  |
| RM10 | 2.00±0.10                                   | 1.25±0.10 | 0.40±0.20 | 0.40±0.20                                  | 0.50±0.10  |
| RM12 | 3.10±0.10                                   | 1.55±0.10 | 0.50±0.30 | 0.40±0.20                                  | 0.55±0.10  |
| RM13 | 3.10±0.10                                   | 2.55±0.10 | 0.50±0.30 | 0.40±0.20                                  | 0.60±0.10  |
| RM20 | 5.00±0.15                                   | 2.50±0.15 | 0.60±0.30 | 0.50±0.25                                  | 0.60±0.10  |
| RM25 | 6.30±0.20                                   | 3.20±0.20 | 0.60±0.30 | 0.50±0.25                                  | 0.60±0.10  |



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**5. Ratings & Characteristics :**

| 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%)<br>E-96&E-24 | D(±0.5%)<br>E-96&E-24 | F(±1%)<br>E-96&E-24 | G(±2%)<br>E-24  | J(±5%)<br>E-24             |
| RM01 | 1/32W                | Refer 5.2      | 15V                  | 30V                    | ±300           |                       |                       | 10Ω ≤ R < 100Ω      | 10Ω ≤ R < 100Ω  | 10Ω ≤ R < 100Ω             |
|      |                      |                |                      |                        | ±200           |                       |                       | 100Ω ≤ R ≤ 1MΩ      | 100Ω ≤ R ≤ 1MΩ  | 100Ω ≤ R ≤ 1MΩ             |
| RM02 | 1/20W                | Refer 5.2      | 25V                  | 50V                    | ±200           | 100Ω-10KΩ             |                       | 10Ω-3MΩ             | 10Ω-3MΩ         | 10Ω-10MΩ                   |
|      |                      |                |                      |                        | +600<br>-200   |                       |                       | 1-9.1Ω              | 1-9.1Ω          | 1-9.1Ω                     |
| RM04 | 1/16W                | Refer 5.2      | 50V                  | 100V                   | ±100           | 100Ω~499KΩ            | 100Ω~1MΩ              | 100Ω~1MΩ            |                 |                            |
|      |                      |                |                      |                        | ±200           | 10Ω ≤ R < 100Ω        | 10Ω ≤ R < 100Ω        | 10Ω ≤ R < 100Ω      | 10Ω-10MΩ        | 10Ω-10MΩ                   |
|      |                      |                |                      |                        | +500<br>-200   |                       |                       | 1Ω-9.1Ω             | 1Ω-9.1Ω         | 1Ω-9.1Ω                    |
|      |                      |                |                      |                        | ±400           |                       |                       |                     | 10MΩ ≤ R ≤ 20MΩ | 10MΩ ≤ R ≤ 20MΩ            |
| RM06 | 1/10W                | Refer 5.2      | 75V                  | 150V                   | ±100           | 10Ω-560kΩ             | 10Ω-1MΩ               | 10Ω-1MΩ             |                 |                            |
|      |                      |                |                      |                        | ±200           |                       |                       | 1M < R ≤ 10MΩ       | 10Ω-10MΩ        | 10Ω-10MΩ                   |
|      |                      |                |                      |                        | ±400           |                       |                       | 1Ω-9.1Ω             | 1Ω-9.1Ω         | 1Ω-9.1Ω<br>10MΩ < R ≤ 20MΩ |
| RM10 | 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         | 1Ω-9.1Ω<br>10MΩ < R ≤ 20MΩ |
| RM12 | 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         | 1Ω-9.1Ω<br>10MΩ < R ≤ 20MΩ |
| RM13 | 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         | 1Ω-9.1Ω<br>10MΩ < R ≤ 20MΩ |
| RM20 | 3/4W                 | 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         | 1Ω-9.1Ω<br>10M < R ≤ 20MΩ  |
| RM25 | 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         | 1Ω-9.1Ω<br>10M < R ≤ 20MΩ  |

**Ω THICK FILM CHIP RESISTORS**

| Type | Rated Current | Max Overload Current | Resistance Range |
|------|---------------|----------------------|------------------|
| RM01 | 0.5A          | 1A                   | 50mΩ MAX         |
| RM02 | 0.5A          | 1A                   | 50mΩ MAX         |
| RM04 | 1A            | 2.5A                 | 50mΩ MAX         |
| RM06 | 1A            | 2.5A                 | 50mΩ MAX         |
| RM10 | 2A            | 5A                   | 50mΩ MAX         |
| RM12 | 2A            | 5A                   | 50mΩ MAX         |
| RM13 | 2A            | 5A                   | 50mΩ MAX         |
| RM20 | 2A            | 5A                   | 50mΩ MAX         |
| RM25 | 2A            | 5A                   | 50mΩ MAX         |

Operating Temp (°C) : -55°C ~ +155°C ( RM01 / 02 : -55°C ~ +125°C )

Note : Except for the above standardized products, we also provide the customized products.



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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

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



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### 6. Reliability Tests :

| Test Items                                      | Reference standard                      | Condition of Test   | Test Limits $\Delta R$   |
|---|---|---|--|
| Temperature Coefficient of Resistance           | IEC60115-1-4.8<br>JIS-C5201-1-4.8       | -55~ +125 °C  | Refer 5.0  |
| Short Time Overload                             | IEC60115-1-4.13<br>JIS-C5201-1-4.13     | 2.5 X rated voltage for 5 sec   | $\pm(1\% + 0.05\Omega)$<br>Remarks :<br>01005& 0201 : $\pm(3\% + 0.1\Omega)$<br>0402 : $\pm(2\% + 0.1\Omega)$<br>0Ω : 50mΩ or less   |
| Intermittent Overload                           | IEC60115-1-4.39<br>JIS-C5201-1-4.39     | 3.0 X rated voltage or Max Overloading voltage ,1sec "ON" , 25sec "OFF" , 10000 cycles<br>(Remarks :<br>01005 & 0201-NA , 0402 2.5 X RCWV * ) | $\pm (5.0\% + 0.1\Omega)$<br>0Ω : 50mΩ or less   |
| Endurance (Load Life)                           | IEC60115-1-4.25.1<br>JIS-C5201-1-4.25.1 | 1000 hours at rated voltage, 70°C , 1.5hours "ON" , 0.5hour "OFF"   | 0.1%,0.5%,1%: $\pm(1.0\%+0.05\Omega)$<br>2%,5%: $\pm(3.0\%+0.1\Omega)$<br>Remarks :<br>01005& 0201 : $\pm(5.0\%+0.1\Omega)$<br>0402 : $\pm(3.0\%+0.1\Omega)$<br>0Ω : 100mΩ or less |
| Load Life with Humidity                         | IEC60115-1-4.24<br>JIS-C5201-1-4.24     | 1000 hours at rated voltage , 40±2°C , 90~95% RH 1.5hours "ON" , 0.5hour "OFF"  | 0.1%,0.5%,1%: $\pm(1.0\%+0.05\Omega)$<br>2% , 5%: $\pm(3.0\%+0.1\Omega)$<br>Remarks :<br>01005&0201: $\pm(5.0\%+0.1\Omega)$<br>0402: $\pm(3.0\%+0.1\Omega)$<br>0Ω : 100mΩ or less  |
| Rapid Change of Temperature                     | IEC60115-1-4.19<br>JIS-C5201-1-4.19     | -55°C (30 min. ) / +155 °C(30 min. ) 5 cycles   | 0.1%,0.5%,1%: $\pm(0.5\%+0.05\Omega)$<br>2% , 5%: $\pm(1.0\%+0.05\Omega)$<br>Remarks :<br>01005& 0201: $\pm(3.0\%+0.1\Omega)$<br>0Ω : 50mΩ or less                                 |
| Solderability                                   | IEC60115-1-4.17<br>JIS-C5201-1-4.17     | 245±5°C solder, 2±0.5 sec dwell.<br>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)             | IEC60115-1-4.33<br>JIS-C5201-1-4.33     | 3mm deflection<br>2mm deflection (RM20,25)  | 0.1%,0.5%,1%: $\pm(0.5\%+0.05\Omega)$<br>2%,5%: $\pm(1.0\%+0.05\Omega)$<br>Remarks :<br>01005& 0201 $\pm(1.0\%+0.1\Omega)$<br>0Ω: 50mΩ or less                                     |
| Dielectric Withstanding Voltage (Voltage Proof) | IEC60115-1-4.7<br>JIS-C5201-1-4.7       | Applying voltage :<br>01005 & 0201 : 50V , 0402 & 0603 : 300V<br>The other 500V for a minute .  | No abnormalities such as flashover, burning dielectric breakdown shall appear.   |
| Insulation Resistance                           | IEC60115-1-4.6<br>JIS-C5201-1-4.6       | Applying voltage 100V for 1 minute.<br>Remark : 01005 & 0201 50V  | $\geq 1G\Omega$<br>Remarks : 01005 : $\geq 100M\Omega$   |
| Resistance to Dry Heat                          | IEC60115-1-4.23.2<br>JIS-C5201-1-4.23.2 | 155±5°C for 96±4Hrs<br>Remark : 01005 & 0201 125±5°C  | 0.1%,0.5%,1%: $\pm(1.0\%+0.05\Omega)$<br>2%,5%: $\pm(2.0\%+0.1\Omega)$<br>Remark :<br>01005 : $\pm(3.0\%+0.1\Omega)$<br>0201 : $\pm(2.0\%+0.1\Omega)$<br>0Ω: 50mΩ or less          |
| Resistance to Solder Heat                       | IEC60115-1-4.18<br>JIS-C5201-1-4.18     | 270 ±5°C solder , 10 ±1 sec dwell .   | 0.1%,0.5%,1%: $\pm(0.5\%+0.05\Omega)$<br>2% , 5%: $\pm(1.0\%+0.05\Omega)$<br>Remarks :<br>01005 : $\pm(3.0\%+0.05\Omega)$<br>0201 $\pm(3.0\%+0.1\Omega)$<br>0Ω: 50mΩ or less       |

Note\* : RCWV : Rated continuous working voltage .



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## 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 Ω, and the third digit represents exponent for base of 10.

E.G. : 102 = 10×10<sup>2</sup> = 1000Ω = 1KΩ



Notes :

**RM06** : R represents the 「 · 」

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

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

E.G. : 1000 = 100×10<sup>0</sup> = 100Ω



### 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 |



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|    |     |    |     |    |     |    |     |
|----|-----|----|-----|----|-----|----|-----|
| 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>-1</sup> | 10 <sup>-2</sup> | 10 <sup>-3</sup> |

E.G : 01A = 100×10<sup>0</sup> = 100Ω



**Notes :**

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

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



**7.4 ±0.1% , ±0.5% , ±1%( E96/3digitals)**

The resistance value by 3 digitals is requirement for customer.

**7.5 RM06 / RM10 / RM12 / RM13 / RM20 / RM25**

E.G. : 0 = 0Ω



**7.6 No Marking for RM01 & RM02 & RM04**



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**8. Taping & Reel :**

**8.1 Taping Dimensions**

**8.1.1 4 mm pitch paper:**



| Packing | Type | A        | B       | W       | F        | E        | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub>      | T        |
|---------|------|----------|---------|---------|----------|----------|----------------|----------------|----------------|---------------------|----------|
| Paper   | RM06 | 1.1±0.1  | 1.9±0.1 | 8.0±0.2 | 3.5±0.05 | 1.75±0.1 | 4.0±0.1        | 2.0±0.05       | 4.0±0.1        | φ 1.5<br>+0.1<br>-0 | 0.64±0.1 |
|         | RM10 | 1.6±0.15 | 2.4±0.2 |         |          |          |                |                |                |                     | 0.84±0.1 |
|         | RM12 | 2.0±0.15 | 3.6±0.2 |         |          |          |                |                |                |                     |          |
|         | RM13 | 2.8±0.2  | 3.6±0.2 |         |          |          |                |                |                |                     |          |

**8.1.2 2 mm pitch paper :**



| Packing | Type | A         | B        | W       | F        | E        | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub>      | T        |
|---------|------|-----------|----------|---------|----------|----------|----------------|----------------|----------------|---------------------|----------|
| Paper   | RM01 | 0.24±0.05 | 0.45±0.1 | 8.0±0.2 | 3.5±0.05 | 1.75±0.1 | 2.0±0.05       | 2.0±0.05       | 4.0±0.1        | φ 1.5<br>+0.1<br>-0 | 0.40±0.1 |
|         | RM02 | 0.37±0.05 | 0.67±0.1 |         |          |          | 2.0±0.05       | 2.0±0.05       |                |                     | 0.37±0.1 |
|         | RM04 | 0.7±0.05  | 1.2±0.05 |         |          |          | 2.0±0.1        | 2.0±0.1        |                |                     | 0.45±0.1 |





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**8.1.3 4 mm pitch Emboss :**



| Packing | Type | A       | B       | W        | F        | E        | P <sub>1</sub> | P <sub>2</sub> | P <sub>0</sub> | D <sub>0</sub> | T         |
|---------|------|---------|---------|----------|----------|----------|----------------|----------------|----------------|----------------|-----------|
| Emboss  | RM20 | 2.8±0.2 | 5.3±0.2 | 12.0±0.2 | 5.5±0.05 | 1.75±0.1 | 4.0±0.1        | 2.0±0.05       | 4.0±0.05       | φ 1.5          | 0.85±0.15 |
|         | RM25 | 3.6±0.2 | 6.9±0.2 |          |          |          |                |                |                |                |           |

**UNIT: mm**

| Package<br>Type / Size |    | Paper Tape |         |            |         | Emboss Plastic Tape<br>4 mm pitch |
|------------------------|----|------------|---------|------------|---------|-----------------------------------|
|                        |    | 4 mm pitch |         | 2 mm pitch |         |                                   |
|                        |    | 178mm/R    | 250mm/R | 178mm/R    | 250mm/R |                                   |
| RM                     | 01 |            |         | 10000      |         |                                   |
| RM                     | 02 |            |         | 10000      |         |                                   |
| RM                     | 04 |            |         | 10000      | 20000   |                                   |
| RM                     | 06 | 5000       | 10000   |            |         |                                   |
| RM                     | 10 | 5000       | 10000   |            |         |                                   |
| RM                     | 12 | 5000       | 10000   |            |         |                                   |
| RM                     | 13 | 5000       |         |            |         |                                   |
| RM                     | 20 |            |         |            |         | 4000                              |
| RM                     | 25 |            |         |            |         | 4000                              |



**Thick Film Chip Resistors**  
 ( Lead-Free for RM series standard )  
**Halogen-Free**

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**8.2 Reel Specifications:**



UNIT: mm

| Type                                  | $\phi A$    | $\phi B$   | $\phi C$   | W          | T          |
|---------------------------------------|-------------|------------|------------|------------|------------|
| RM01 / 02 / 04 / 06<br>RM10 / 12 / 13 | 178.0 ± 2.0 | 60.0 ± 1.0 | 13.0 ± 1.0 | 9.0 ± 1.0  | 11.5 ± 1.0 |
| RM20 / 25                             |             |            |            | 13.0 ± 1.0 | 15.5 ± 1.0 |

**8.3. Peel –off force :**

Peel –off force of paper and blister tape is in accordance with “JIS-C5202 ”  
 that is , 0.1 to 0.7 N at a peel-off speed of 300 mm / minute.





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**9. Label :**

**9.1 Manufacture Label :**



**9.2 Customer Label ( By customer request ):**



**10. Recommended land patterns :**



| Type | Land pattern<br>Size | Dimension ( mm ) |         |           |
|------|----------------------|------------------|---------|-----------|
|      |                      | a                | b       | c         |
| RM   | 01 (01005 )          | 0.15~0.20        | 0.5~0.7 | 0.20~0.25 |
| 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   |



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**11. Recommend IR – Reflow profile : (solder : Sn96.5 / Ag3 / Cu0.5)**



| Profile Feature  | Lead (Pb )-Free Assembly          |
|--|-----------------------------------|
| Average ramp-up rate<br>(T <sub>smax</sub> to T <sub>p</sub> )   | 3°C / second max.                 |
| Preheat<br>- Temperature Min (T <sub>smmin</sub> )<br>- Temperature Max (T <sub>smax</sub> )<br>- Time (T <sub>smmin</sub> to T <sub>smax</sub> ) (ts) | 150°C<br>200°C<br>60 -150 seconds |
| Time maintained above :<br>- Temperature (T <sub>l</sub> )<br>- Time (T <sub>l</sub> )   | 217°C<br>60-120 seconds           |
| Peak Temperature (T <sub>p</sub> )   | 260°C                             |
| Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak<br>Temperature (tp) <sup>2</sup>  | 10 seconds                        |
| Ramp-down Rate   | 6°C/second max.                   |
| Time 25°C to Peak Temperature  | 8mimutes max.                     |

Allowed Re-flow times : 3 times

Remark : To avoid discoloration phenomena of chip on terminal electrodes,  
 please use N2 Re-flow furnace .

**12. Storage Conditions:**

Temperature: 5°C~35°C, Humidity:40%~75%

**13. Shelf Life:**

2 years from manufacturing date.



**Thick Film Chip Resistors**  
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**14. ECN :**

Engineering Change Notice: The customer will be informed with ECN if there is significant modification on the characteristics and materials described in Approval Sheet.

**15. Manufacturing Country & City :**

TA-I TECHNOLOGY CO., LTD. ( Taiwan– Tao Yuan )  
Tel : 886-3-3246169 Fax : 886-3-3246167

TA-I TECHNOLOGY ( SU ZHOU ) CO., LTD. ( China – Su Zhou )  
Tel : 86- 512-63457879 Fax : 86-512-63457869

**Associated companies :**

(1) FORTUNE TASK RESISTOR FACTORY ( China – Dongguan )  
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(2) TA-I TECHNOLOGY ELECTRONIC (DONGGUAN ) CO., LTD. ( China –Dongguan )  
Tel : 86-769-8339-4790~3 Fax : 86-769-8339-4794

(3) TAI OHM ELECTRONICS ( M ) SDN. BHD. ( Malaysia – Penang )  
Tel : 604- 3900480 Fax : 604-3901481

(4) P.T.TAI ELECTRONICS Indonesia ( Indonesia – Jakarta )  
Tel : 62-21-89830123 Fax : 62-21-89830703

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