



**Thin Film Chip Resistors
RBS series Standard
(Halogen –Free)**

Document No

TRBS-XX0S001E

Issued date

2024/03/27

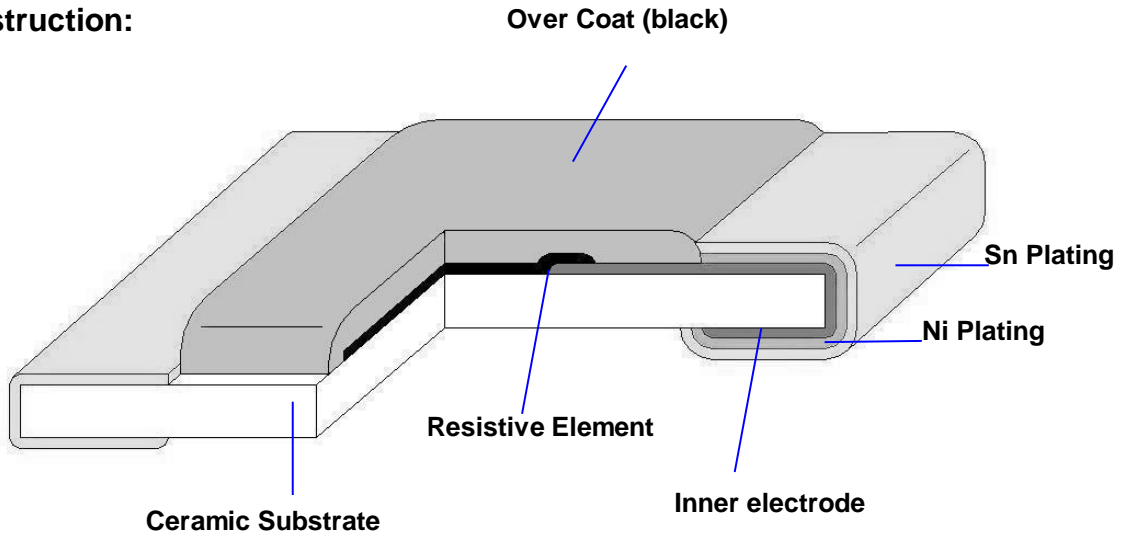
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1. Scope:

This specification applies for the Anti Sulfurated RBS series of thin film chip resistors made by TA-I.

2. Construction:



3. Type Designation:

RBS

06

B

T

P

1001

Product Code

Size

Tolerance

Packaging

TCR

Nominal Resistance

RBS : Anti Sulfurated
Thin Film

Power Rating

Resistance

| | | | | |
|--|---|------------------|---|-------------------|
| 04-0402(1005) 1/16W 06-0603(1608) 1/10W 10-0805(2012) 1/8W 12-1206(3216) 1/4W | A- ±0.05% B- ±0.10% C- ±0.25% D- ±0.50% F- ±1.00% | T- Paper Tape | k- ±10 ppm M- ±15 ppm P- ±25 ppm S- ±50 ppm R- ±100 ppm | e.g., 1001=1kΩ |
|--|---|------------------|---|-------------------|



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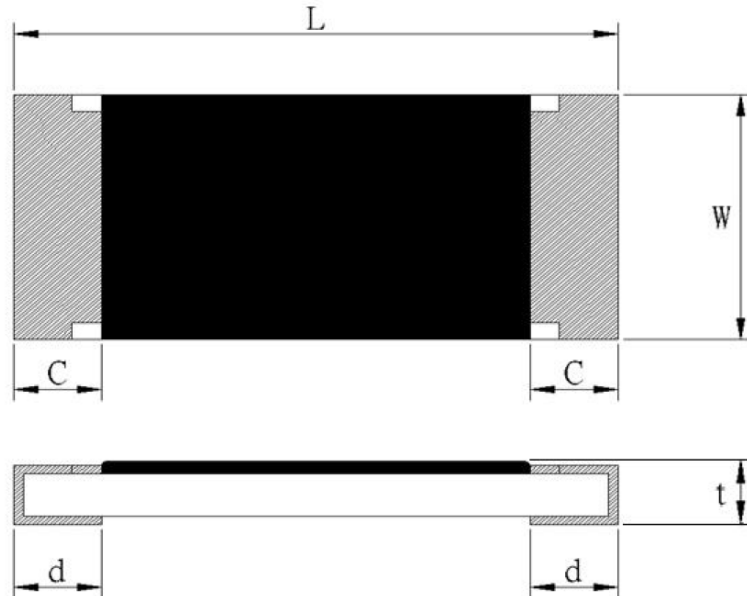
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4. Dimensions:



UNIT: mm

| Type | L | W | C | d | t |
|-------|-----------------|-----------------|-----------------|---------------------------|-----------------|
| RBS04 | 1.00 ± 0.1 | 0.50 ± 0.05 | 0.20 ± 0.10 | 0.25 ± 0.10 | 0.35 ± 0.1 |
| RBS06 | 1.60 ± 0.10 | 0.80 ± 0.10 | 0.30 ± 0.20 | $0.30 + 0.20$ $- 0.10$ | 0.45 ± 0.10 |
| RBS10 | 2.00 ± 0.10 | 1.25 ± 0.10 | 0.40 ± 0.20 | 0.40 ± 0.20 | 0.50 ± 0.15 |
| RBS12 | 3.20 ± 0.15 | 1.55 ± 0.15 | 0.50 ± 0.30 | 0.40 ± 0.20 | 0.55 ± 0.15 |



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5. Ratings & Characteristics

Standard:

| Type | Power Rating at 70°C | Rated Voltage | Max. Working Voltage | Max. Over- Load Voltage | T.C.R (PPM/°C) | Resistance Range | Resistance tolerance(%) |
|-------|----------------------|---------------|----------------------|-------------------------|----------------------------------|------------------|-------------------------|
| RBS04 | 1/16 W | Refer 5.2 | 50V | 100V | ±50 ±100 | 4.7Ω~9.1Ω | ± 0.5~ ±1.0 |
| RBS04 | 1/16 W | Refer 5.2 | 50V | 100V | ±10 ±25 ±50 ±100 | 10Ω~150KΩ | ± 0.1~ ±1.0 |
| RBS06 | 1/10W | Refer 5.2 | 75V | 150V | ±25 ±50 ±100 | 1Ω~4.6Ω | ± 0.5~ ±1.0 |
| RBS06 | 1/10W | Refer 5.2 | 75V | 150V | ±10 ±15 ±25 ±50 ±100 | 4.7Ω~511KΩ | ± 0.1~ ±1.0 |
| RBS10 | 1/8 W | Refer 5.2 | 150V | 300V | ±25 ±50 ±100 | 1~9.1Ω | ± 0.5~ ±1.0 |
| RBS10 | 1/8 W | Refer 5.2 | 150V | 300V | ±10 ±25 ±50 ±100 | 10Ω~800KΩ | ± 0.1~ ±1.0 |
| RBS12 | 1/4 W | Refer 5.2 | 150V | 300V | ±25 ±50 ±100 | 1~9.1Ω | ± 0.5~ ±1.0 |
| RBS12 | 1/4 W | Refer 5.2 | 150V | 300V | ±10 ±25 ±50 ±100 | 10Ω~1MΩ | ± 0.1~ ±1.0 |

Operating Temp(°C): -55°C ~ +155°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 according to figure 1.

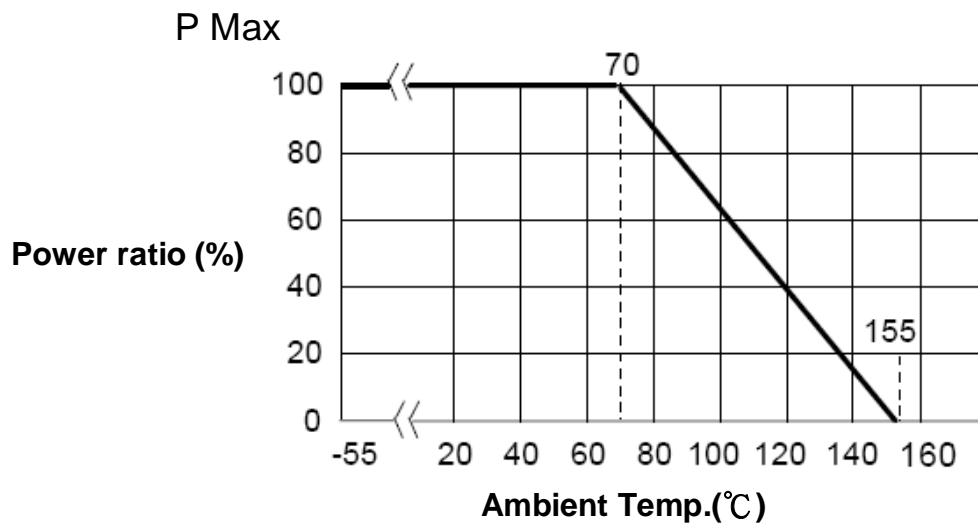


Figure 1.

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)



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6. Reliability Tests:

| Test Items | Reference standard | Condition of Test | Test Limits |
|---|---|---|---|
| Flowers of sulfur corrosion (FoS) | ASTM-B-809-95* *Modified | Sulfur 1000 Hours, 105°C Unpower | 1%+0.05Ω |
| Temperature Coefficient of Resistance | IEC60115-1-4.8 JIS C5201-1-4.8 | +25~+125 °C | Refer 5.0 |
| Rapid Change of Temp. | IEC60115-1-4.19 JIS C 5201-1-4.19 | -55°C (30 min.) / +125°C (30 min.), 300 cycles | ±(0.5%+0.05Ω) |
| Short Time Overload | IEC60115-1-4.13 JIS C5201-1-4.13 | 2.5 X rated voltage for 5sec | ±(0.5%+0.05Ω) |
| Resistance to Dry Heat | IEC60115-1-4.23.2 JIS C5201-1-4.23.2 | 155±5°C for 96±4Hrs | ±(0.5% +0.05Ω) |
| Load Life | IEC60115-1-4.25.1 JIS C5201-1-4.25.1 | 1000 hours at rated power , 70°C , 1.5hours“ON “, 0.5hour “OFF” | ±(0.5% +0.05Ω) |
| Resistance to Solder Heat | IEC60115-1-4.18 JIS C5201-1-4.18 | 260 ±5°C solder , 10 ±1 sec dwell . | 0.1%:±(0.25% +0.05Ω) 0.5%.1%:±(0.5% +0.05Ω) |
| Bending | IEC60115-1-4.33 JIS C5201-1-4.33 | 3mm deflection | ±(0.5% +0.05Ω) |
| Dielectric Withstanding Voltage (Voltage Proof) | IEC60115-1-4.7 JIS C5201-1-4.7 | Applying voltage : 0402 & 0603 : 300V The other 500V for a minute . | No abnormalities such as flashover, burning dielectric breakdown shall appear. |
| Load Life with Humidity | IEC60115-1-4.24 JIS C5201-1-4.24 | 40±2°C/90~95% RH for 1000 hours. 1.5 hours“ON “,0.5 hour “OFF (RCWV)” | ±(0.5% +0.05Ω) |
| Insulation Resistance | IEC60115-1-4.6 JIS C5201-1-4.6 | Applying voltage 100V for 1 minute. | ≥ 1GΩ |
| Solderability | IEC60115-1-4.17 JIS C5201-1-4.17 | 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. |

Note* :RCWV : Rated continuous working voltage .

MSL : Moisture Sensitivity Level 1.



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7. Marking

7.1 ±0.1% , ±0.5% , ±1% (E96) : RBS10 / RBS12

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 = $100 \times 10^0 = 100\Omega$

7.2 ±0.1% , ±0.5% , ±1% (RBS06/E96)

When the marking space is too small in such small-sized resistors as RBS06, 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 | 10^0 | 10^1 | 10^2 | 10^3 | 10^4 | 10^5 | 10^6 | 10^7 | 10^{-1} | 10^{-2} | 10^{-3} |

Ex: 02c=102 $\times 10^2=10.2k\Omega$



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7.3 ±0.1% , ±0.5% , ±1% (RBS06/E24)

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

| Symbol | E24 | Marking | Symbol | E24 | Marking | Symbol | E24 | Marking |
|--------|------|------------|--------|------|------------|--------|------|------------|
| 1 | 12R | <u>120</u> | 31 | 510R | <u>511</u> | 61 | 30K | <u>303</u> |
| 2 | 16R | <u>160</u> | 32 | 560R | <u>561</u> | 62 | 33K | <u>333</u> |
| 3 | 18R | <u>180</u> | 33 | 620R | <u>621</u> | 63 | 36K | <u>363</u> |
| 4 | 22R | <u>220</u> | 34 | 680R | <u>681</u> | 64 | 39K | <u>393</u> |
| 5 | 24R | <u>240</u> | 35 | 820R | <u>821</u> | 65 | 43K | <u>433</u> |
| 6 | 27R | <u>270</u> | 36 | 910R | <u>911</u> | 66 | 47K | <u>473</u> |
| 7 | 30R | <u>300</u> | 37 | 1K2 | <u>122</u> | 67 | 51K | <u>513</u> |
| 8 | 33R | <u>330</u> | 38 | 1K6 | <u>162</u> | 68 | 56K | <u>563</u> |
| 9 | 36R | <u>360</u> | 39 | 1K8 | <u>182</u> | 69 | 62K | <u>623</u> |
| 10 | 39R | <u>390</u> | 40 | 2K2 | <u>222</u> | 70 | 68K | <u>683</u> |
| 11 | 43R | <u>430</u> | 41 | 2K4 | <u>242</u> | 71 | 82K | <u>823</u> |
| 12 | 47R | <u>470</u> | 42 | 2K7 | <u>272</u> | 72 | 91K | <u>913</u> |
| 13 | 51R | <u>510</u> | 43 | 3K0 | <u>302</u> | 73 | 120K | <u>124</u> |
| 14 | 56R | <u>560</u> | 44 | 3K3 | <u>332</u> | 74 | 160K | <u>164</u> |
| 15 | 62R | <u>620</u> | 45 | 3K6 | <u>362</u> | 75 | 180K | <u>184</u> |
| 16 | 68R | <u>680</u> | 46 | 3K9 | <u>392</u> | 76 | 220K | <u>224</u> |
| 17 | 82R | <u>820</u> | 47 | 4K3 | <u>432</u> | 77 | 240K | <u>244</u> |
| 18 | 91R | <u>910</u> | 48 | 4K7 | <u>472</u> | 78 | 270K | <u>274</u> |
| 19 | 120R | <u>121</u> | 49 | 5K1 | <u>512</u> | 79 | 300K | <u>304</u> |
| 20 | 160R | <u>161</u> | 50 | 5K6 | <u>562</u> | 80 | 330K | <u>334</u> |
| 21 | 180R | <u>181</u> | 51 | 6K2 | <u>622</u> | 81 | 360K | <u>364</u> |
| 22 | 220R | <u>221</u> | 52 | 6K8 | <u>682</u> | 82 | 390K | <u>394</u> |
| 23 | 240R | <u>241</u> | 53 | 8K2 | <u>822</u> | 83 | 430K | <u>434</u> |
| 24 | 270R | <u>271</u> | 54 | 9K1 | <u>912</u> | 84 | 470K | <u>474</u> |
| 25 | 300R | <u>301</u> | 55 | 12K | <u>123</u> | 85 | 510K | <u>514</u> |
| 26 | 330R | <u>331</u> | 56 | 16K | <u>163</u> | 86 | 560K | <u>564</u> |
| 27 | 360R | <u>361</u> | 57 | 18K | <u>183</u> | 87 | 620K | <u>624</u> |
| 28 | 390R | <u>391</u> | 58 | 22K | <u>223</u> | 88 | 680K | <u>684</u> |
| 29 | 430R | <u>431</u> | 59 | 24K | <u>243</u> | 89 | 820K | <u>824</u> |
| 30 | 470R | <u>471</u> | 60 | 27K | <u>273</u> | 90 | 910K | <u>914</u> |



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Ex.: 0603 , 120Ω , 0.1% Marking is 121



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

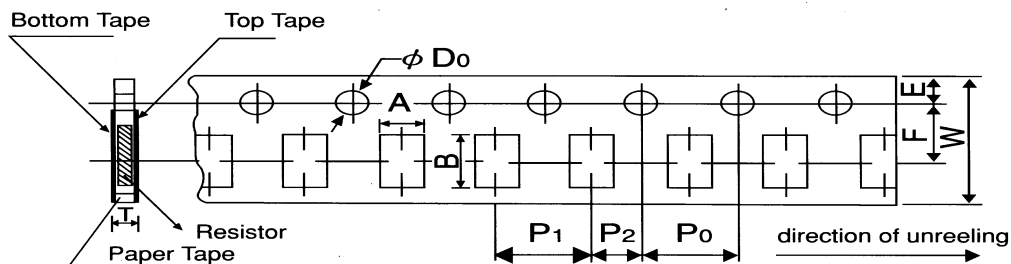
The resistance value by 3 digits is requirement for customer.

7.5 No Marking for RBS04

8. Taping & Reel

8.1 Taping Dimensions

8.1.1 4 mm pitch paper



| Packing | Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D ₀ | T |
|------------|-------|----------|---------|---------|----------|----------|----------------|----------------|----------------|--|----------|
| Paper Tape | RBS06 | 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±0.1 | 4.0±0.1 | Φ _{1.5} ^{+0.1} ₋₀ | 0.64±0.1 |
| | RBS10 | 1.6±0.15 | 2.4±0.2 | | | | | | | | 0.84±0.1 |
| | RBS12 | 2.0±0.15 | 3.6±0.2 | | | | | | | | 0.84±0.1 |

UNIT: mm



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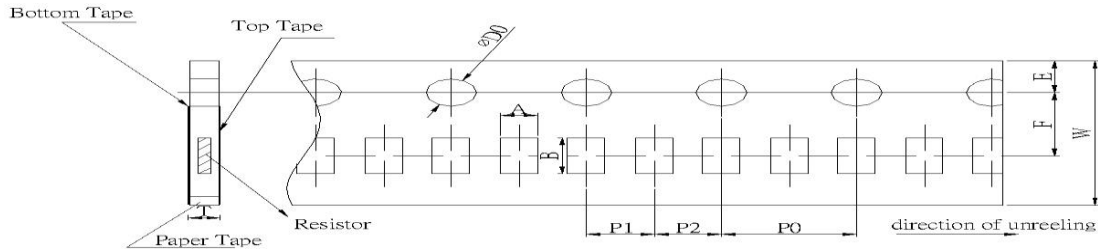
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8.1.2 2 mm pitch paper



| Packing | Type | A | B | W | F | E | P ₁ | P ₂ | P ₀ | D ₀ | T |
|---------|-------|----------|----------|---------|----------|----------|----------------|----------------|----------------|--|----------|
| Paper | RBS04 | 0.7±0.05 | 1.2±0.05 | 8.0±0.2 | 3.5±0.05 | 1.75±0.1 | 2.0±0.1 | 2.0±0.1 | 4.0±0.1 | Φ _{1.5} ^{+0.1} ₋₀ | 0.45±0.1 |

UNIT: mm

| | | Paper Tape | |
|------|------|------------|------------|
| | | 4 mm pitch | 2 mm pitch |
| Type | Size | 180mm/R | 180mm/R |
| RBS | 04 | | 10000 |
| RBS | 06 | 5000 | |
| RBS | 10 | 5000 | |
| RBS | 12 | 5000 | |



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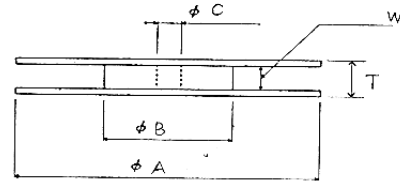
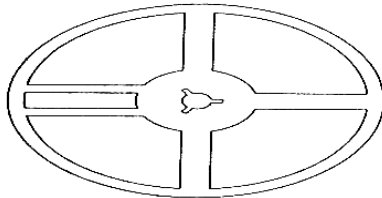
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8.2 Reel Specifications

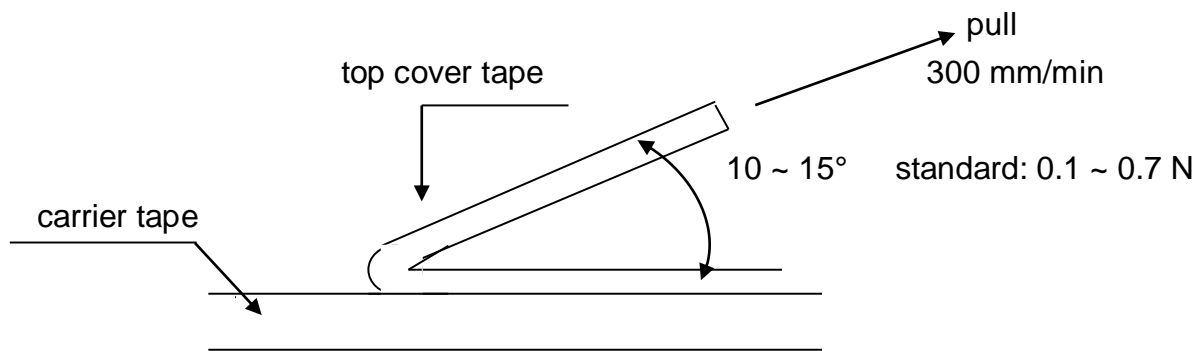


| Type | ΦA | ΦB | ΦC | W | T |
|---------------------------|------------|-----------|-----------|----------|-----------|
| RBS 04 / 06 RBS10 / 12 | 178.0 ±2.0 | 60.0 ±1.0 | 13.0 ±1.0 | 9.0 ±1.0 | 11.4 ±1.0 |

UNIT: mm

8.3 Peel – off force:

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



UNIT:mm



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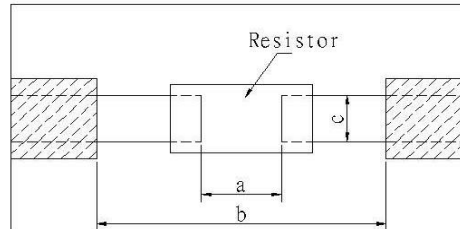
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9. Recommended land patterns



| Type | Land pattern Size | Dimension (mm) | | |
|------|----------------------|------------------|-----------|----------|
| | | a | b | c |
| RBS | 04 (0402) | 0.5 ~ 0.6 | 1.4 ~ 1.6 | 0.5~ 0.6 |
| RBS | 06 (0603) | 0.7 ~ 0.9 | 2.0 ~ 2.2 | 0.9 ~1.0 |
| RBS | 10 (0805) | 1.0 ~ 1.4 | 3.2 ~ 3.8 | 1.3 ~1.4 |
| RBS | 12 (1206) | 2.0 ~ 2.4 | 4.4 ~ 5.0 | 1.6 ~1.8 |

10. 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.

11. Storage Conditions:

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

12. Shelf Life:

2 years from manufacturing date.



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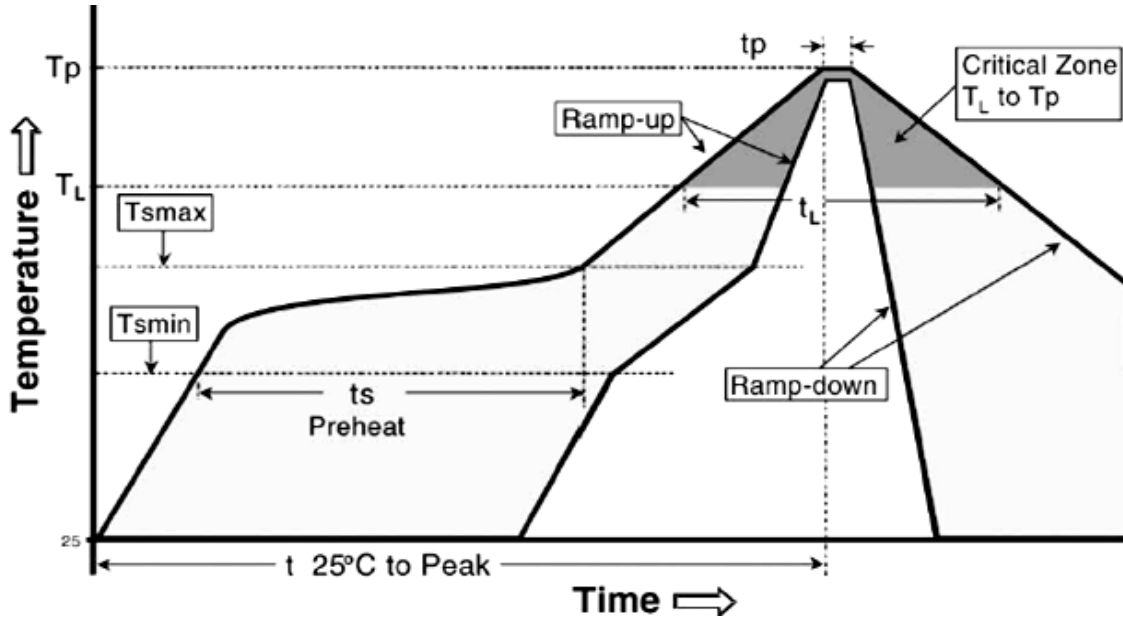
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13. Recommend IR – Reflow profile: (solder : Sn96.5 / Ag3 / Cu0.5)



| Profile Feature | Lead (Pb)-Free Assembly |
|---|-----------------------------------|
| Average ramp-up rate (T _{smax} to T _p) | 3°C / second max. |
| Preheat - Temperature Min (T _{smin}) - Temperature Max (T _{smax}) - Time (T _{smin} to T _{smax}) (t _s) | 150°C 200°C 60 -150 seconds |
| Time maintained above : - Temperature (T _L) - Time (T _L) | 217°C 60-120 seconds |
| Peak Temperature (T _p) | MAX:260°C |
| Time within $\begin{matrix} +0 \\ -5 \end{matrix}$ °C of actual Peak Temperature (t _p) ² | 10 seconds |
| Ramp-down Rate | 6°C/second max. |
| Time 25°C to Peak Temperature | 8minutes max. |



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14. Manufacturing Country & City :

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