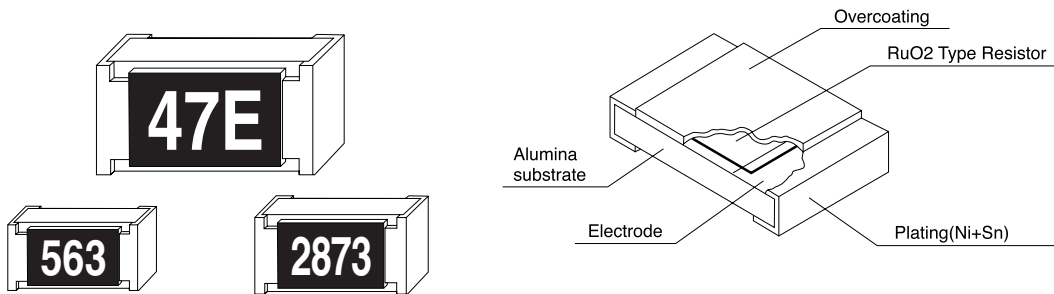


# THICK FILM CHIP RESISTORS

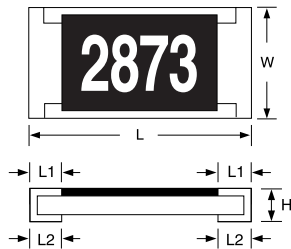
## CONSTRUCTION



### OPERATING TEMPERATURE RANGE

-55°C ~  
+155°C

## DIMENSIONS



Unit: mm

| Type     | Dimensions | L           | W   | H   | L1          | L2          |
|----------|------------|-------------|---|---|-------------|-------------|
| ATR 0402 |            | 1.00 ± 0.10 | 0.50 ± 0.05   | 0.30 ± 0.05   | 0.20 ± 0.10 | 0.25 ± 0.10 |
| ATR 0603 |            | 1.55 ± 0.10 | 0.80 ± $\begin{smallmatrix} 0.10 \\ 0.05 \end{smallmatrix}$ | 0.45 ± 0.10   | 0.30 ± 0.15 | 0.30 ± 0.15 |
| ATR 0805 |            | 2.00 ± 0.10 | 1.25 ± 0.10   | 0.50 ± 0.10   | 0.35 ± 0.20 | 0.35 ± 0.15 |
| ATR 1206 |            | 3.05 ± 0.10 | 1.55 ± 0.10   | 0.55 ± $\begin{smallmatrix} 0.10 \\ 0.05 \end{smallmatrix}$ | 0.45 ± 0.20 | 0.35 ± 0.15 |
| ATR 1210 |            | 3.05 ± 0.10 | 2.55 ± 0.10   | 0.55 ± 0.10   | 0.50 ± 0.20 | 0.50 ± 0.20 |
| ATR 2010 |            | 5.00 ± 0.20 | 2.50 ± 0.20   | 0.55 ± 0.10   | 0.60 ± 0.20 | 0.60 ± 0.20 |
| ATR 2512 |            | 6.30 ± 0.20 | 3.20 ± 0.20   | 0.55 ± 0.10   | 0.60 ± 0.20 | 0.60 ± 0.20 |

## General Specifications

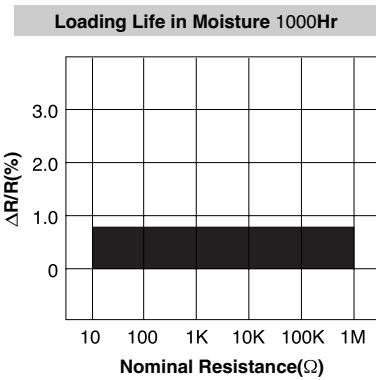
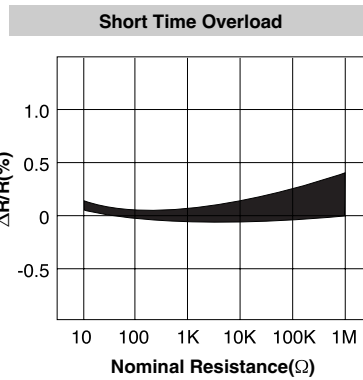
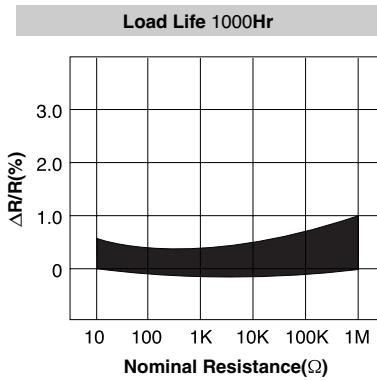
| Type     | Rated Power at 70°C | Max. Working Voltage | Max. Overload Voltage | T.C.R. (ppm/°C)                                      | Resistance Range $\geq 1\Omega$ |   |                           |  | Jumper Rated Current | Jumper Resistance Value |
|----------|---------------------|----------------------|-----------------------|--|---------------------------------|---|---------------------------|--|----------------------|-------------------------|
|          |                     |                      |                       |  | D( $\pm 0.5\%$ ) E-96           | F( $\pm 1\%$ ) E-96   | G( $\pm 2\%$ ) E-24       | J( $\pm 5\%$ ) E-24  |                      |                         |
| ATR 0402 | $\frac{1}{16}$ W    | 50V                  | 100V                  | $\begin{smallmatrix} +500 \\ -200 \end{smallmatrix}$ | -                               | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$   | 1A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | 100 $\Omega$ ~990 $\Omega$      | 10 $\Omega$ ~990 $\Omega$   | 10 $\Omega$ ~990 $\Omega$ |  |                      |                         |
| ATR 0603 | $\frac{1}{10}$ W    | 50V                  | 100V                  | $\pm 100$  | 100 $\Omega$ ~1M $\Omega$       | 33 $\Omega$ ~1M $\Omega$  | -                         | -  | 1A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | 10 $\Omega$ ~99 $\Omega$        | $\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$ | 10 $\Omega$ ~10M $\Omega$ | 10 $\Omega$ ~10M $\Omega$  |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$  | $\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$ |                      |                         |
| ATR 0805 | $\frac{1}{8}$ W     | 150V                 | 300V                  | $\pm 100$  | 100 $\Omega$ ~1M $\Omega$       | 33 $\Omega$ ~1M $\Omega$  | -                         | -  | 2A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | -                               | $\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$ | 10 $\Omega$ ~10M $\Omega$ | 10 $\Omega$ ~10M $\Omega$  |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$  | $\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$ |                      |                         |
| ATR 1206 | $\frac{1}{4}$ W     | 200V                 | 400V                  | $\pm 100$  | 100 $\Omega$ ~1M $\Omega$       | 33 $\Omega$ ~1M $\Omega$  | -                         | -  | 2A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | -                               | $\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$ | 10 $\Omega$ ~10M $\Omega$ | 10 $\Omega$ ~10M $\Omega$  |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$  | $\begin{smallmatrix} 1\Omega\sim 9.9\Omega \\ 11M\Omega\sim 26M\Omega \end{smallmatrix}$ |                      |                         |
| ATR 1210 | $\frac{1}{3}$ W     | 200V                 | 400V                  | $\pm 100$  | 100 $\Omega$ ~1M $\Omega$       | 33 $\Omega$ ~1M $\Omega$  | -                         | -  | 2A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | -                               | $\begin{smallmatrix} 10\Omega\sim 32\Omega \\ 1.1M\sim 10M\Omega \end{smallmatrix}$ | 10 $\Omega$ ~10M $\Omega$ | 10 $\Omega$ ~20M $\Omega$  |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$  | 1 $\Omega$ ~9.9 $\Omega$   |                      |                         |
| ATR 2010 | $\frac{3}{4}$ W     | 200V                 | 400V                  | $\pm 100$  | -                               | 10 $\Omega$ ~1M $\Omega$  | -                         | -  | 2A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | -                               | -   | 10 $\Omega$ ~1M $\Omega$  | 10 $\Omega$ ~1M $\Omega$   |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | -   | -                         | 1 $\Omega$ ~9.9 $\Omega$   |                      |                         |
| ATR 2521 | 1W                  | 200V                 | 400V                  | $\pm 100$  | -                               | 10 $\Omega$ ~1M $\Omega$  | -                         | -  | 2A                   | 50m $\Omega$ MAX        |
|          |                     |                      |                       | $\pm 200$  | -                               | -   | 10 $\Omega$ ~1M $\Omega$  | 10 $\Omega$ ~1M $\Omega$   |                      |                         |
|          |                     |                      |                       | $\pm 400$  | -                               | -   | -                         | 1 $\Omega$ ~9.9 $\Omega$   |                      |                         |

## CHARACTERISTICS

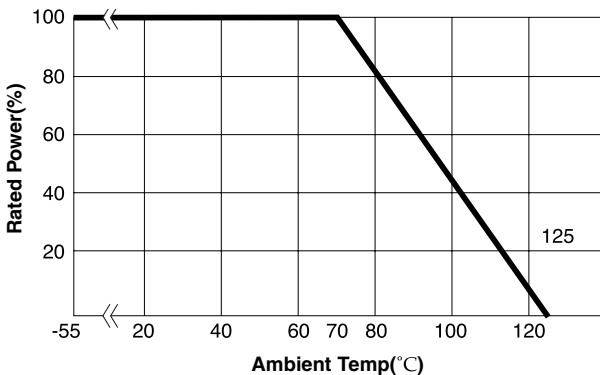
| Item                            | 0.5% · 1% (R ≥ 1Ω)                   | 2% · 5% (R ≥ 1Ω) | Test Method  |
|---------------------------------|--------------------------------------|------------------|--|
| Temperature Cycling             | ± (0.5% + 0.05Ω)                     | ± (1.0% + 0.05Ω) | JIS-C5202-7.4<br>Cycle between -55°C and +125°C for 5 cycles   |
| Low Temperature Operation       | ± (0.5% + 0.05Ω)                     | ± (1.0% + 0.05Ω) | MIL-R-55342-D 4.7.4<br>Followed by 45 Minutes of RCWV.   |
| Short Time Overload             | ± (1.0% + 0.05Ω)                     | ± (2.0% + 0.10Ω) | JIS-C5202-5.5<br>Apply rated voltage 2.5 times for 5 seconds   |
| Resistance to Soldering Heat    | ± (1.0% + 0.05Ω)                     | ± (1.0% + 0.05Ω) | JIS-C5202-6.10<br>Immerse for 10 sec. in solder at 260 ± 5°C   |
| Loading Life in Moisture        | ± (1% + 0.05Ω)                       | ± (2.0% + 0.1Ω)  | JIS-C5202-7.9<br>40°C, 1000Hrs at RCWV, 1.5Hr ON, 0.5Hr OFF  |
| Resistance to dry heat          | ± (1.0% + 0.05Ω)                     | ± (2.0% + 0.10Ω) | JIS-C5202-7.2<br>96Hrs at 125°C  |
| Load Life                       | ± (1.0% + 0.05Ω)                     | ± (3.0% + 0.10Ω) | JIS-C5202-7.10<br>70°C, 1000Hrs at RCWV, 1.5Hr ON, 0.5Hr OFF   |
| Solderability                   | Coverage ≥ 95%                       | Coverage ≥ 95%   | JIS-C5202-6.11<br>Immerse for 3 sec. in solder at 245 ± 3°C  |
| Bending Strength                | ± (1.0% + 0.05Ω)                     | ± (1.0% + 0.05Ω) | JIS-C5202-6.1.4<br>Amount of band: ATR0402, ATR0603, ATR0805=5mm, ATR1206, ATR1210=3mm, ATR2010, ATR2521=2mm |
| Intermittent Overload           | ± (5.0% + 0.10Ω)                     | ± (5.0% + 0.10Ω) | JIS-C5202-5.8<br>Apply rated voltage 1sec ON, 25sec OFF, 10000 cycles  |
| Dielectric Withstanding Voltage | No short or burned on the appearance |                  | JIS-C5202-5.7<br>Apply 500VAC for 1min(ATR0402 300VAC, ATR0603 300VAC/1Min)                                  |
| Terminal Strength               | No evidence of mechanical damage     |                  | JIS-C5202-6.1.4<br>Apply 5N pushing force for 10sec.   |

\*RCWV=Rated Continuous Working Voltage

## CHARACTERISTIC DATA



## POWER DERATING CURVE



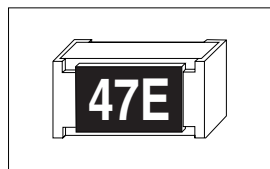
## MARKING

FOR E-24 & E-96

- 2%, 5% 3 digits indication
- first 2 digits are significant figures
- 3rd digit is multiplier( $10^x$ )
- EX. Marking -> 563
- $56 \times 10^3 = 56000\Omega = 56K\Omega$

- 1% 4 digits indication
- first 3 digits are significant figures
- 4th digit is multiplier( $10^x$ )
- EX. Marking -> 3922
- $392 \times 10^2 = 39200\Omega = 39.2K\Omega$

TYPE ATR0402: No marking Code



FOR ATR0603 1%(E-96)

- 3 digit indication
- first 2 significant for E-96 Part marking scheme.
- 3rd digit is multiplier:
- Y =  $10^2$    X =  $10^{-1}$    A =  $10^0$    B =  $10^1$
- C =  $10^2$    D =  $10^3$    E =  $10^4$    F =  $10^5$

# THICK FILM CHIP RESISTORS

## ■ STANDARD RESISTANCE VALUES

• For 2%, 5%(E-24)

|    |    |    |    |    |
|----|----|----|----|----|
| 10 | 11 | 12 | 13 | 15 |
| 16 | 18 | 20 | 22 | 24 |
| 27 | 30 | 33 | 36 | 39 |
| 43 | 47 | 51 | 56 | 62 |
| 68 | 75 | 82 | 91 |    |

• For 1%(E-96)

|     |     |     |     |     |     |     |     |     |     |     |     |
|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| 100 | 102 | 105 | 107 | 110 | 113 | 115 | 118 | 121 | 124 | 127 | 130 |
| 133 | 137 | 140 | 143 | 147 | 150 | 154 | 158 | 162 | 165 | 169 | 174 |
| 178 | 182 | 187 | 191 | 196 | 200 | 205 | 210 | 215 | 221 | 226 | 232 |
| 237 | 243 | 249 | 255 | 261 | 267 | 274 | 280 | 287 | 294 | 301 | 309 |
| 316 | 324 | 332 | 340 | 348 | 357 | 365 | 374 | 383 | 392 | 402 | 412 |
| 422 | 432 | 442 | 453 | 464 | 475 | 487 | 499 | 511 | 523 | 536 | 549 |
| 562 | 576 | 590 | 604 | 619 | 634 | 649 | 665 | 681 | 698 | 715 | 732 |
| 750 | 768 | 787 | 806 | 825 | 845 | 866 | 887 | 909 | 931 | 953 | 976 |

## ■ ALTERNATE MARKING METHOD

• For ATR0603 1%(E-96)

| Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value | Code | R Value |
|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|------|---------|
| 1    | 100     | 13   | 133     | 25   | 178     | 37   | 237     | 49   | 316     | 61   | 422     | 73   | 562     |
| 2    | 102     | 14   | 137     | 26   | 182     | 38   | 243     | 50   | 324     | 62   | 432     | 74   | 576     |
| 3    | 105     | 15   | 140     | 27   | 187     | 39   | 249     | 51   | 332     | 63   | 442     | 75   | 590     |
| 4    | 107     | 16   | 143     | 28   | 191     | 40   | 255     | 52   | 340     | 64   | 453     | 76   | 604     |
| 5    | 110     | 17   | 147     | 29   | 196     | 41   | 261     | 53   | 348     | 65   | 464     | 77   | 619     |
| 6    | 113     | 18   | 150     | 30   | 200     | 42   | 267     | 54   | 357     | 66   | 475     | 78   | 634     |
| 7    | 115     | 19   | 154     | 31   | 205     | 43   | 274     | 55   | 365     | 67   | 487     | 79   | 649     |
| 8    | 118     | 20   | 158     | 32   | 210     | 44   | 280     | 56   | 374     | 68   | 499     | 80   | 665     |
| 9    | 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     |

## ■ EXPLANATION OF PART NUMBERS

(EX)

| ATR                          | 0402   | 101   | J  | TP   |
|------------------------------|--|---|--|--|
| Type                         | Size   | Nominal Resistance  | Tolerance                                      | Packing  |
| Thick Film<br>Chip Resistors | 0402<br>0603<br>0805<br>1206<br>1210<br>2010<br>2512 | <ul style="list-style-type: none"> <li>■ Resistors</li> <li>• 3-Digit: E24 Series<br/>Ex 2.2Ω=2R2<br/>100Ω=101</li> <li>• 4-Digit: E96 Series<br/>Ex 10.2Ω=10R2<br/>10KΩ=1002</li> <li>■ Jumper: 000</li> </ul> | D = ± 0.5%<br>F = ± 1%<br>G = ± 2%<br>J = ± 5% | TH: 2mm Pitch Paper<br>(Taping) 10000pcs<br>TP: 4mm Pitch Paper<br>(Taping) 5000pcs<br>TE: 4mm Pitch Emboss<br>(Taping) 4000pcs<br>BA: Bulk Case |