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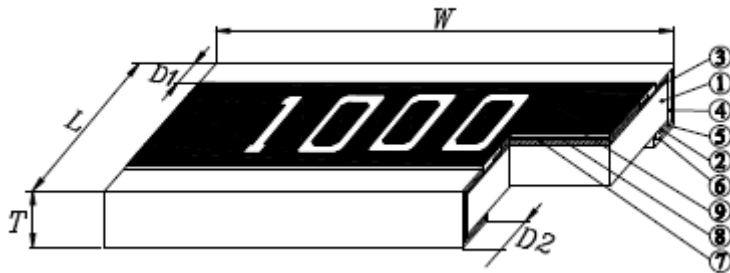
Thick Film Chip Resistor SMD Wide Terminal

SPECIFICATION

Part
Number

| 022 | 05* | 1001* | J* | T05** | C |
|--|-----------|--|-----------------------------------|--|--------------|
| Type | Size | Value | Tolerance | Packing | Power Rating |
| 022 : SMD Thick Film Chip Resistor Wide Terminal | A5 : 0508 | The last digit is the multiplier | J : $\pm 5\%$ | T05: Tape and reel for 5k pc (7"reel) 0508 and 0612 size | I: 3/4W |
| | 62 : 0612 | which denotes the number of zero following | F : $\pm 1\%$ | E04: Tape and reel for 4k pc (7"reel) 1020 and 1225 size | J: 1W |
| | A2 : 1020 | 0000=0Ohm | D : $\pm 0,5\%$ | | K: 1,5W |
| | 15 : 1225 | | | | L: 2W |
| | | Example: | | | M: 3W |
| | | 97R6= | | | |
| | | 97,6Ohm | | | |
| | | 9760 = | | | |
| | | 9760hm | | | |
| | | 1001 = | | | |
| | | 1kOhm | | | |
| | | E24-Series is first digit "0" | | | |
| | | | | | |
| | | | | | |
| | | | * not all combination is possible | | |

All products according to RoHS (2015/863/EU)



| | | |
|---------------------|----------------------|----------------------|
| ① Alumina Substrate | ④ Edge Electrode | ⑦ Resistor Layer |
| ② Bottom Electrode | ⑤ Barrier Layer | ⑧ Primary Overcoat |
| ③ Top Electrode | ⑥ External Electrode | ⑨ Secondary Overcoat |

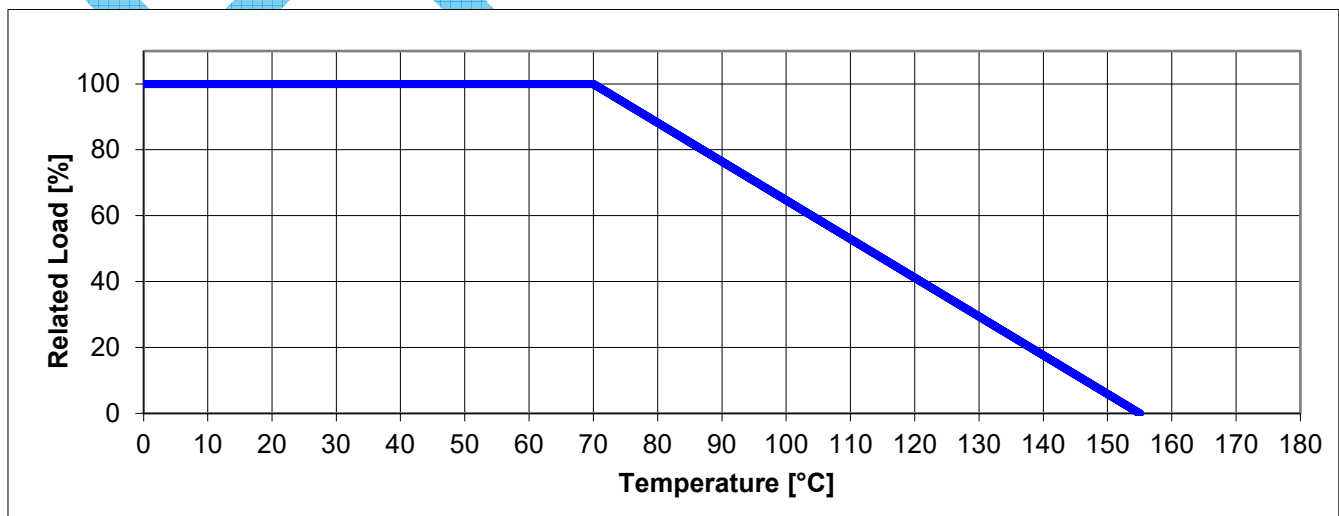
Dimensions

| SIZE | L | W | T | D1 | D1 |
|--------------------|-----------|-----------|-----------|-----------|-----------|
| 0508 Jumper | 1,25±0,10 | 2,00±0,15 | 0,55±0,10 | 0,30±0,15 | 0,30±0,15 |
| | | | | 0,20±0,15 | |
| 0612 Jumper | 1,55±0,10 | 3,00±0,15 | 0,55±0,10 | 0,25±0,15 | 0,40±0,15 |
| 1020 Jumper | 2,45±0,15 | 5,00±0,10 | 0,60±0,15 | 0,35±0,20 | 0,70±0,20 |
| | | | | 0,45±0,20 | |
| 1225 Jumper | 3,20±0,20 | 6,40±0,15 | 0,65±0,15 | 0,40±0,20 | 1,10±0,20 |
| | | | | 0,50±0,20 | 0,70±0,20 |

(unit: mm)

Power Derating Curve

For all resistors operated in ambient temperatures above 70°C, power rating must be derated in accordance with the curve below. Operating temperature -55°C to +155°C



SMD

THICK FILM CHIP RESISTORS

Rating

014 Series

GENERAL PURPOSE CHIP RESISTORS

Standard Type

| Type | Size | Power Rating at 70°C | Max. Operating Voltage | Max. Overload Voltage | Operating temperature | Temperature Coefficient [TCR; ppm/°C] | Resistance Range [Ω] | | |
|--------|------|----------------------|------------------------|-----------------------|-----------------------|---------------------------------------|----------------------|-------------------|-------------|
| | | | | | | | F(±1%) E-24, E-96 | F(±1%) E-24, E-96 | J(±5%) E-24 |
| 022 A5 | 0508 | 3/4W | 200V | 400V | -55 ~ +155°C | ±150 | 1Ω≤R≤9,76Ω | | |
| | | | | | | ±100 | 10Ω≤R≤1MΩ | | |
| 022 62 | 0612 | 1W | 200V | 400V | | ±100 | 1Ω≤R≤1MΩ | | |
| 022 A2 | 1020 | 1,5W | 200V | 400V | | ±150 | 1Ω≤R≤9,76Ω | | |
| | | | | | | ±100 | 10Ω≤R≤1MΩ | | |
| 014 15 | 1225 | 2W | 200V | 400V | | ±200 | 1Ω≤R≤29,4Ω | | |
| | | | | | | ±100 | 30Ω≤R≤1MΩ | | |

High Power -Type

| Type | Size | Power Rating at 70°C | Max. Operating Voltage | Max. Overload Voltage | Operating temperature | Temperature Coefficient [TCR; ppm/°C] | Resistance Range [Ω] | | | Jumper Rated Current | Jumper Resistance Value J |
|--------|------|----------------------|------------------------|-----------------------|-----------------------|---------------------------------------|----------------------|-------------------|-------------|----------------------|---------------------------|
| | | | | | | | F(±1%) E-24, E-96 | F(±1%) E-24, E-96 | J(±5%) E-24 | | |
| 022 A5 | 0508 | 1W | 200V | 400V | -55 ~ +155°C | ±150 | 1Ω≤R≤9,76Ω | | | 5A | 10mΩ Max |
| | | | | | | ±100 | 10Ω≤R≤1MΩ | | | | |
| 022 62 | 0612 | 1,5W | 200V | 400V | | ±100 | 1Ω≤R≤1MΩ | | | 6A | 10mΩ Max |
| 022 A2 | 1020 | 2W | 200V | 400V | | ±150 | 1Ω≤R≤9,76Ω | | | 10A | 10mΩ Max |
| | | | | | | ±100 | 10Ω≤R≤1MΩ | | | | |
| 014 15 | 1225 | 3W | 200V | 400V | | ±200 | 1Ω≤R≤29,4Ω | | | 12A | 10mΩ Max |
| | | | | | | ±100 | 30Ω≤R≤1MΩ | | | | |

Operating Voltage= $\sqrt{P \cdot R}$ or Max. operating voltage listed above, whichever is lower.

Overload Voltage= $2,5 \cdot \sqrt{P \cdot R}$ or Max. overload voltage listed above, whichever is lower.

Marking

1%: 4 digit marking

Example: 20 Ohm Marking 20R0
100 Ohm Marking 1000
1kOhm Marking 1001

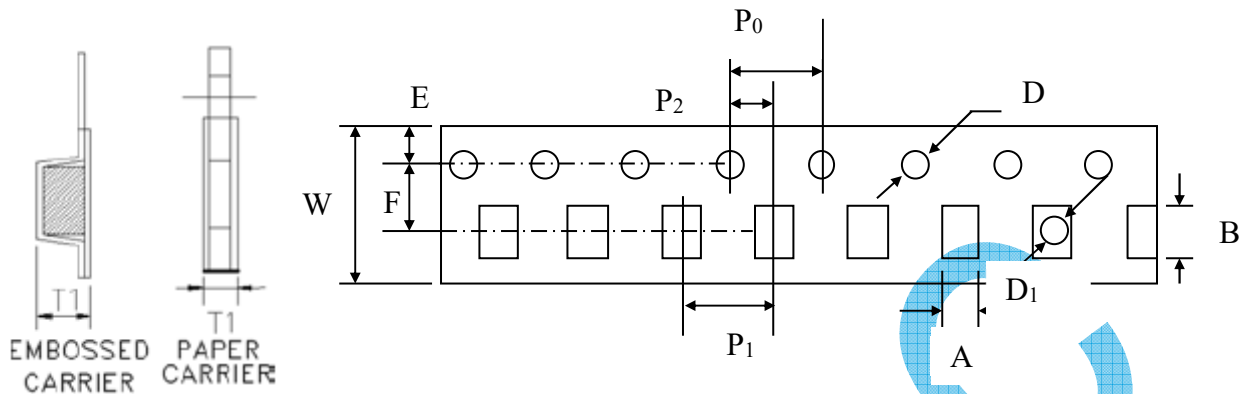
5%: 3 digit marking in E24:

E24 code 10 11 12 13 15 16 18 20 22 24 27 30 33 36 39 43 47 51 56 62 68 75 82 91

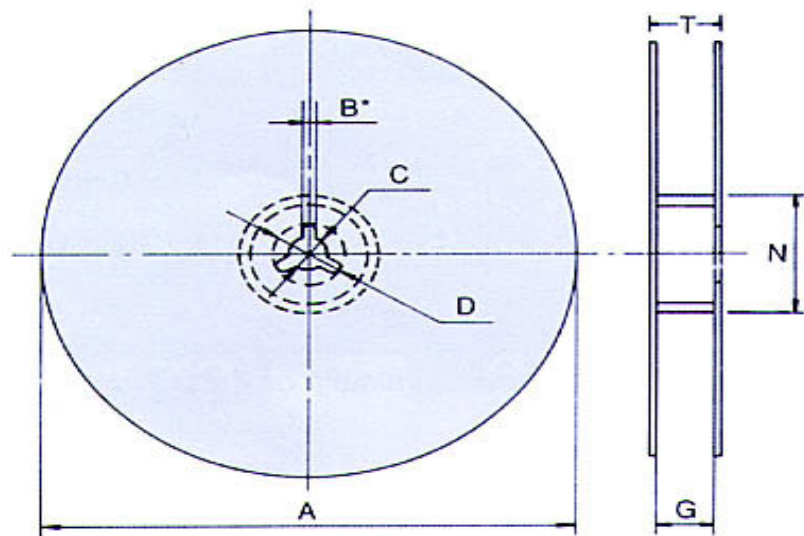
Example: 100 Ohm Marking 101
1kOhm Marking 102

SMD

SPECIFICATION

Tape And Reel Package

| Packing | Size | A | B | W | E | F | P ₀ | P ₁ | P ₂ | D | D ₁ | T ₁ |
|---------------|------|-----------|-----------|-----------|-----------|-----------|----------------|----------------|----------------|-----------|----------------|----------------|
| Paper Tape | 0508 | 1,60±0,10 | 2,40±0,20 | 8,0±0,20 | 1,75±0,10 | 3,50±0,05 | 4,00±0,10 | 4,00±0,05 | 2,00±0,05 | 1,50±0,10 | - | 0,85±0,10 |
| | 0612 | 1,90±0,10 | 3,50±0,20 | | | 5 | | | | | | |
| Embossed Tape | 1020 | 2,80±0,15 | 5,40±0,20 | 12,0±0,10 | | 5,5±0,05 | 4,00±0,05 | 4,00±0,10 | | 1,55±0,10 | 1,5±0,25 | 1,00±0,20 |
| | 1225 | 3,50±0,10 | 6,70±0,10 | 0 | | | | | | | | |

Reel size

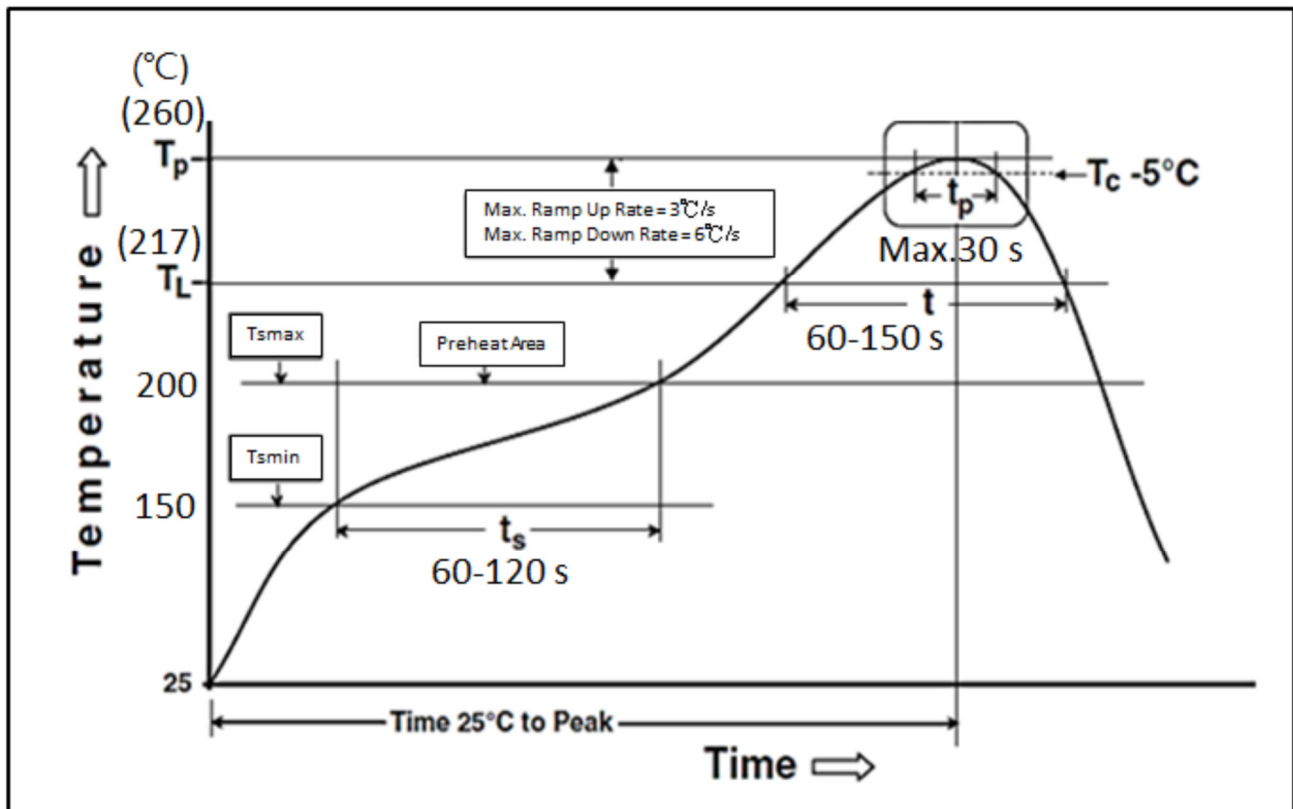
| Symbol | | Reel Type / Tape | A | N | C | G | T |
|-----------|---------------|------------------------|-----------|-----------|----------|----------|----------|
| Dimension | Paper Tape | 7" reel for 8 mm Tape | 178,5±1,5 | 60,0+1 -0 | 13,0±0,2 | 9,0±0,5 | 12,5±0,5 |
| | Embossed Tape | 7" reel for 12 mm Tape | | | | 13,0±0,5 | 15,5±0,5 |

in mm

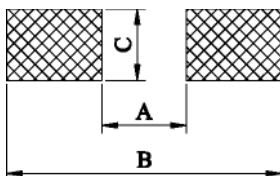
Stock period

The Temperature condition must be controlled at 22 ± 6 °C, the R.H. must be controlled at less than 80%. The stock can maintain quality level in 12 month.

Soldering Profile IPC/JEDEC J-STD-020



Recommended Land Pattern Design:



| Size | A | B | C |
|------|------|------|------|
| 0508 | 0,55 | 2,35 | 2,00 |
| 0612 | 0,70 | 2,30 | 3,20 |
| 1020 | 1,00 | 3,40 | 5,00 |
| 1225 | 1,00 | 5,00 | 7,00 |

Environmental Characteristics

| Item | Requirement | Test Method |
|--|--|---|
| Temperature Coefficient of Resistance (T.C.R.) | As Spec. | JIS-C-5201-1 4.8 IEC-60115-1 4.8 25°C/-55°C~25°C/+125°C, 25°C is the reference temperature |
| Short Time Overload | $\pm(1,0\%+0,05\Omega)$ | JIS-C-5201-1 4.13 IEC-60115-1 4.13 RCWV*2,5 or Max. overload voltage whichever is lower for 5 seconds |
| Insulation Resistance | $\geq 10G$ | JIS-C-5201-1 4.6 IEC-60115-1 4.6 Max. overload voltage for 1 minute |
| Endurance | $\pm(1,0\%+0,10\Omega)$ | JIS-C-5201-1 4.25 IEC-60115-1 4.25.1 70 \pm 2°C, RCWV for 1000 hrs. with 1,5 hrs. "ON" and 0,5 hrs. "OFF" |
| Damp Heat with Load | $\pm(1,0\%+0,10\Omega)$ | JIS-C-5201-1 4.24 IEC-60115-1 4.24 40 \pm 2°C, 90~95% R.H. RCWV for 1000 hrs. with 1,5 hrs. "ON" and 0,5 hrs. "OFF" |
| Dry Heat | $\pm(1,0\%+0,05\Omega)$ | JIS-C-5201-1 4.23 IEC-60115-1 4.23.2 at +125/+155°C for 1000 hrs. |
| Bending Strength | $\pm(1,0\%+0,05\Omega)$ | JIS-C-5201-1 4.33 IEC-60115-1 4.33 Bending once for 60 seconds with 3mm |
| Solderability | 95% min. coverage | JIS-C-5201-1 4.17 IEC-60115-1 4.17 245 \pm 5°C for 3 seconds |
| Resistance to Soldering Heat | $\pm(0,5\%+0,05\Omega)$ | JIS-C-5201-1 4.18 IEC-60115-1 4.18 260 \pm 5°C for 10 seconds |
| Voltage Proof | No breakdown or flashover | JIS-C-5201-1 4.7 IEC-60115-1 4.7 1,42 times Max. Operating Voltage for 1 minute |
| Leaching | Individual leaching area $\leq 5\%$ Total leaching area $\leq 10\%$ | JIS-C-5201-1 4.18 IEC-60068-2-58 8.2.1 260 \pm 5°C for 30 seconds |
| Rapid Change of Temperature | $\pm(0,5\%+0,05\Omega)$ | JIS-C-5201-1 4.19 IEC-60115-1 4.19 -55°C to +125/+155°C, 5 cycles |

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