

**Technical Data**

AEC-Q200 data

Metal Film Chip Resistors, High Reliability type

ERA3A Series (0603 size)

AEC-Q200 test items

- ( 3 ) High Temperature Exposure
- ( 4 ) Temperature Cycling
- ( 6 ) Moisture Resistance
- ( 7 ) Biased Humidity
- ( 8 ) Operation Life
- (10) Physical Dimension
- (12) Resistance to Solvents
- (14) Vibration
- (15) Resistance to Soldeing Heat
- (16) Thermal Shock
- (17) ESD
- (18) Solderability
- (19) Electrical Characterization
- (21) Board Flex
- (22) Terminal Strength (SMD)

Circuit Components Business Division  
Panasonic Corporation  
Engineering Group

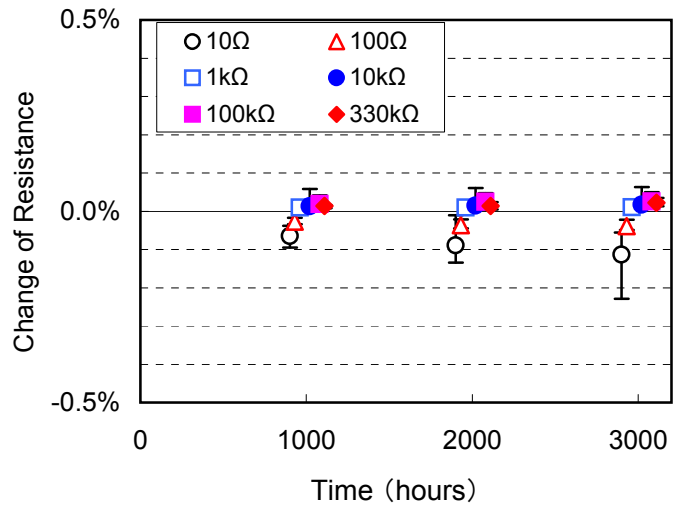
| APPROVAL          | CHECKED        | DESIGN         |
|-------------------|----------------|----------------|
| <i>K.Yoshioka</i> | <i>K.Kanda</i> | <i>K.Kanda</i> |

(3) High Temperature Exposure

155°C±3°C, 1000 hours  
without load  
n=77

< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.5\% + 0.05\Omega)$  after 1000h  
 Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.1\% + 0.05\Omega)$  after 1000h

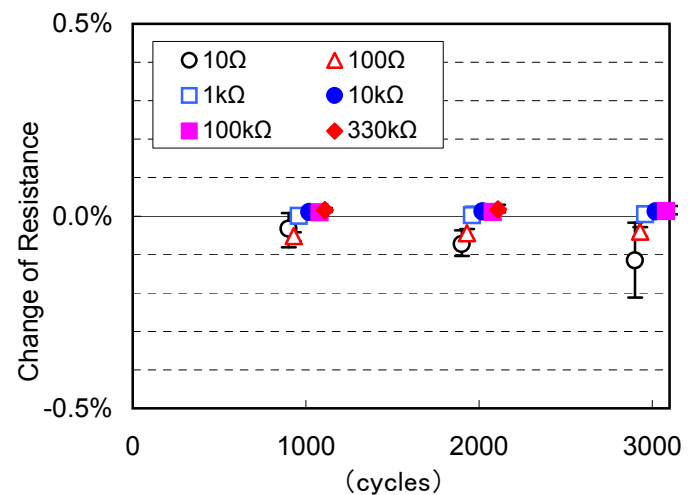


(4) Temperature Cycling

-55°C±3°C, 30 minutes  
 ↑ ↓  
 155°C±3°C, 30 minutes  
 n=77

< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.5\% + 0.05\Omega)$  after 1000 cycles  
 Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.1\% + 0.05\Omega)$  after 1000 cycles

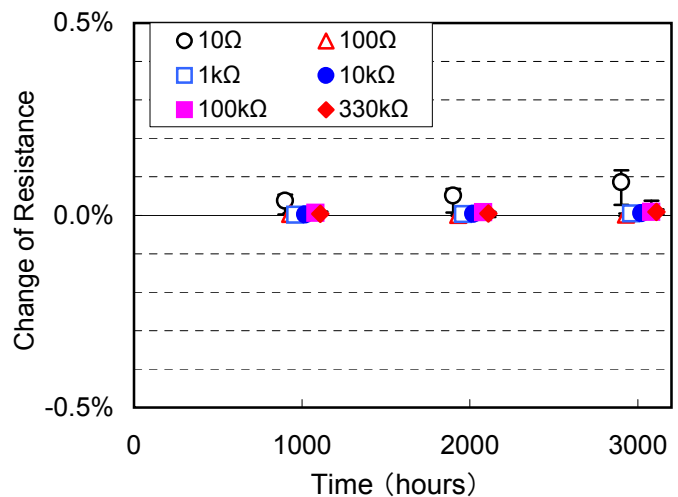


(6) Moisture resistance

85°C±2°C, 85%RH  
1000 hours without load  
n=77

< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.5\% + 0.05\Omega)$  after 1000h  
 Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ  
 $\Delta R : \pm (0.1\% + 0.05\Omega)$  after 1000h



(7) Biased Humidity

85°C±2°C, 85%RH, 1000 hours

Apply voltage 1.5h ON - 0.5h OFF

(Maximum Rated Voltage : 75V)

Applied Voltage

10 to 56kΩ: Rated Voltage

Over 56kΩ: 23.7V (10% of rated power)

n=77

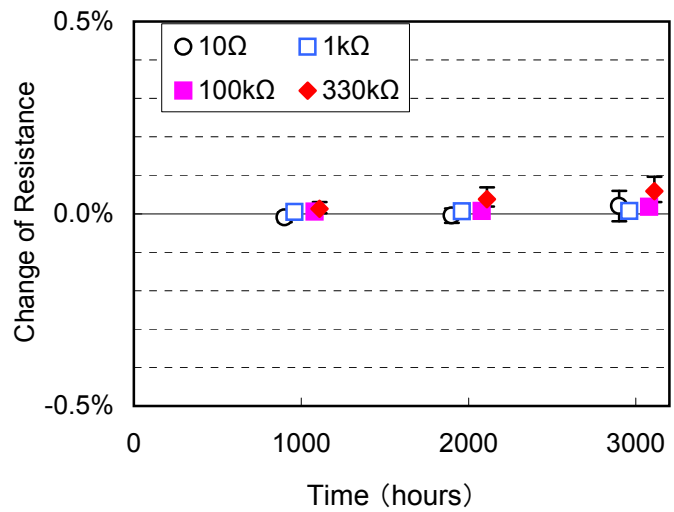
< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ

ΔR : ± (0.5% + 0.05Ω) after 1000h

Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ

ΔR : ± (0.1% + 0.05Ω) after 1000h



(8) Operational Life

70°C, 1000 hours

Rated voltage 1.5h ON - 0.5h OFF

(Maximum Rated Voltage : 75V)

n=77

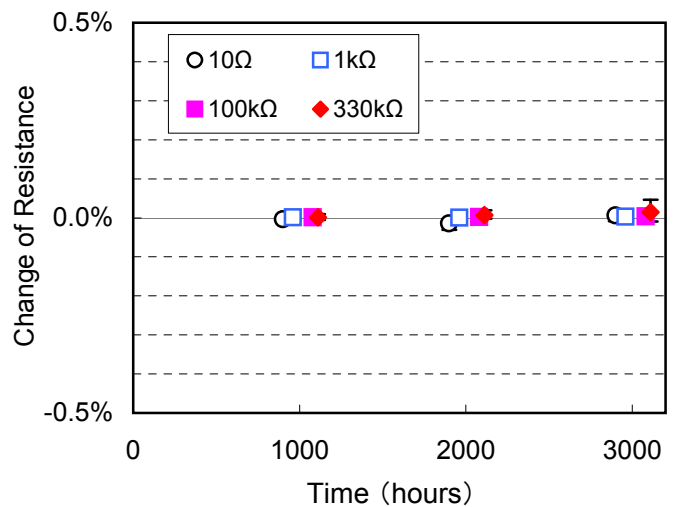
< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ

ΔR : ± (0.5% + 0.05Ω) after 1000h

Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ

ΔR : ± (0.1% + 0.05Ω) after 1000h



(10) Physical Dimension

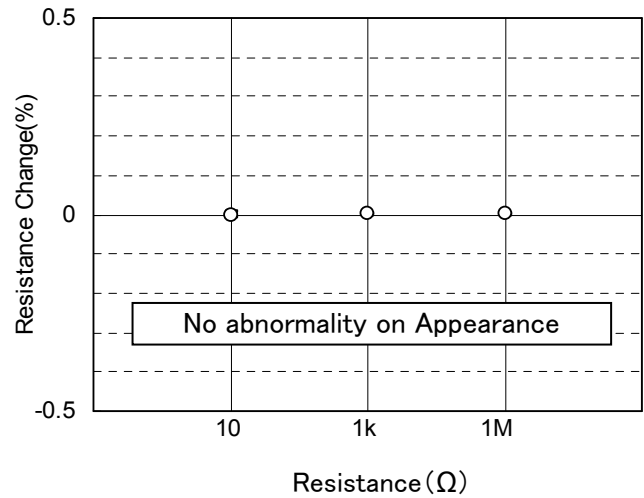
| Item    | L         | W         | t         |
|---------|-----------|-----------|-----------|
| Spec    | 1.60±0.15 | 0.80±0.15 | 0.45±0.10 |
| UCL     | 1.75      | 0.95      | 0.55      |
| LCL     | 1.45      | 0.65      | 0.35      |
| 1       | 1.517     | 0.812     | 0.403     |
| 2       | 1.497     | 0.807     | 0.410     |
| 3       | 1.499     | 0.815     | 0.404     |
| 4       | 1.513     | 0.817     | 0.407     |
| 5       | 1.496     | 0.814     | 0.417     |
| 6       | 1.510     | 0.821     | 0.409     |
| 7       | 1.502     | 0.814     | 0.407     |
| 8       | 1.510     | 0.817     | 0.406     |
| 9       | 1.501     | 0.818     | 0.414     |
| 10      | 1.492     | 0.807     | 0.413     |
| 11      | 1.507     | 0.825     | 0.403     |
| 12      | 1.503     | 0.816     | 0.406     |
| 13      | 1.499     | 0.816     | 0.406     |
| 14      | 1.491     | 0.817     | 0.435     |
| 15      | 1.517     | 0.825     | 0.404     |
| 16      | 1.497     | 0.812     | 0.407     |
| 17      | 1.490     | 0.805     | 0.407     |
| 18      | 1.497     | 0.812     | 0.414     |
| 19      | 1.505     | 0.825     | 0.415     |
| 20      | 1.506     | 0.818     | 0.406     |
| 21      | 1.500     | 0.816     | 0.406     |
| 22      | 1.499     | 0.821     | 0.409     |
| 23      | 1.498     | 0.808     | 0.409     |
| 24      | 1.499     | 0.818     | 0.418     |
| 25      | 1.498     | 0.819     | 0.414     |
| 26      | 1.497     | 0.806     | 0.404     |
| 27      | 1.497     | 0.806     | 0.404     |
| 28      | 1.490     | 0.814     | 0.416     |
| 29      | 1.489     | 0.818     | 0.409     |
| 30      | 1.505     | 0.830     | 0.405     |
| AVERAGE | 1.501     | 0.816     | 0.410     |
| MAX.    | 1.517     | 0.830     | 0.435     |
| MIN.    | 1.489     | 0.805     | 0.403     |
| STDEV   | 0.007     | 0.006     | 0.007     |
| PpK     | 2.26      | 7.20      | 3.04      |

(12) Resistance to Solvents

Immerse in IPA for  $5 \pm 1$  min  
 Ultra sonic  $0.3W/cm^2$ , 28kHz  
 n=30

< Specification >

No abnormality on appearance



(14) Vibration

frequency : 10 to 55Hz, 1min / cycle  
 amplitude : 1.5mm  
 2h of each orientation  
 (total 6h)  
 n=30

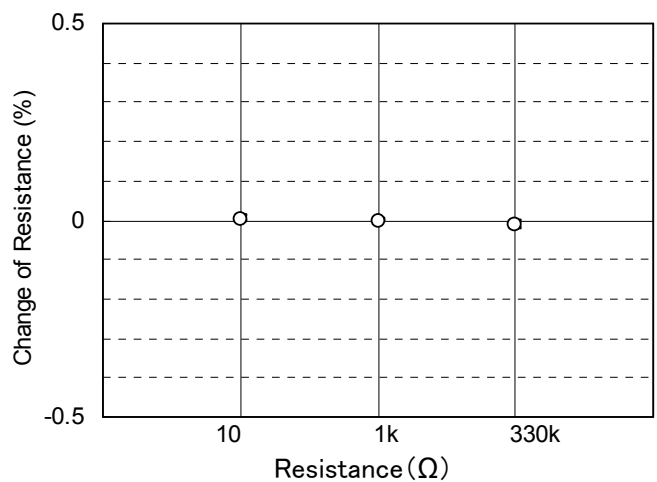
< Specification >

Tolerance  $\pm 0.5\%$  :  $10\Omega \leq R \leq 330k\Omega$

$$\Delta R : \pm (0.5\% + 0.05\Omega)$$

Tolerance  $\pm 0.1\%$  :  $47\Omega \leq R \leq 330k\Omega$

$$\Delta R : \pm (0.1\% + 0.05\Omega)$$



(15) Resistance to Soldering Heat

Solder bath temp.:  $270^\circ C \pm 3^\circ C$   
 Dipping time : 10 seconds  
 n=30

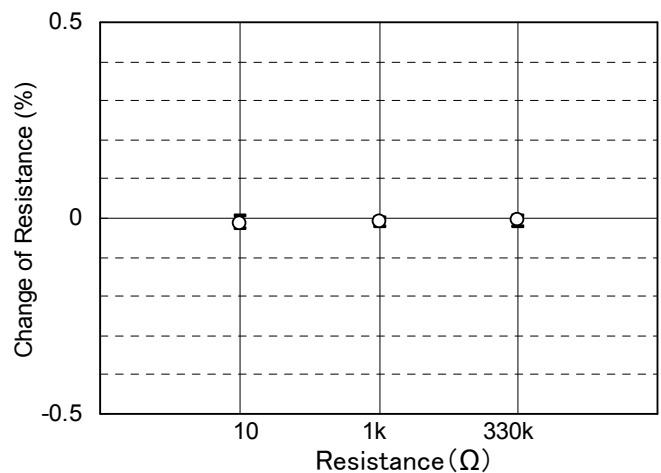
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$$\Delta R : \pm (0.5\% + 0.05\Omega)$$

Tolerance  $\pm 0.1\%$  :  $47\Omega \leq R \leq 330k\Omega$

$$\Delta R : \pm (0.1\% + 0.05\Omega)$$



(16) Thermal Shock

-55°C±3°C、30min

↑ ↓ (within 20s)

155°C±3°C、30min

n=30, 1000 cycles

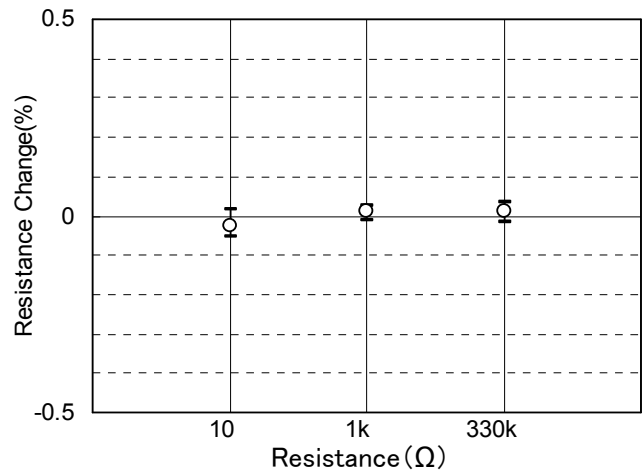
< Specification >

Tolerance ±0.5% : 10Ω ≤ R ≤ 330kΩ

ΔR : ± (0.5% + 0.05Ω)

Tolerance ±0.1% : 47Ω ≤ R ≤ 330kΩ

ΔR : ± (0.1% + 0.05Ω)



(17) ESD

Human Body Model

Cd = 150pF

Rd = 2000Ω

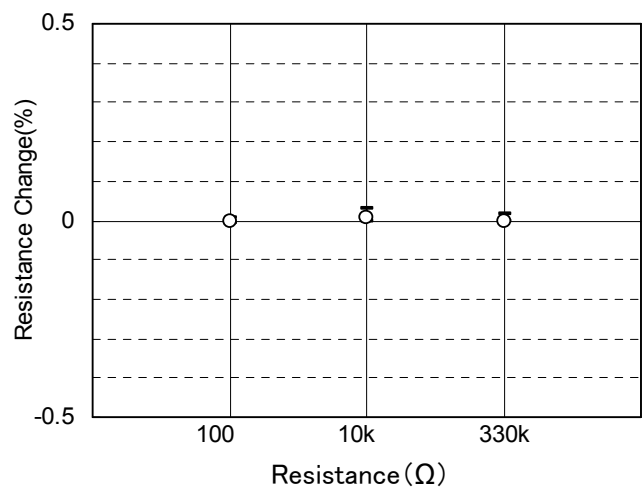
Voltage : 500V

Direct contact discharge

n=20

< Specification >

N/A : Reference data



(18) Solderability

Solder bath temp.: 235°C±3°C

Dipping time : 2s±0.5s

n=30

< Specification >

No abnormality on appearance

| Condition         | Resistance | Appearance     |
|-------------------|------------|----------------|
| 235±3°C<br>2±0.5s | 10Ω        | No abnormality |
|                   | 10kΩ       | No abnormality |
|                   | 330kΩ      | No abnormality |

(19) Electrical Characterization

(Temperature Coefficient on Resistance)

Hot : 25°C to 125°C: ○

Cold : -55°C to 25°C: ●

n=30

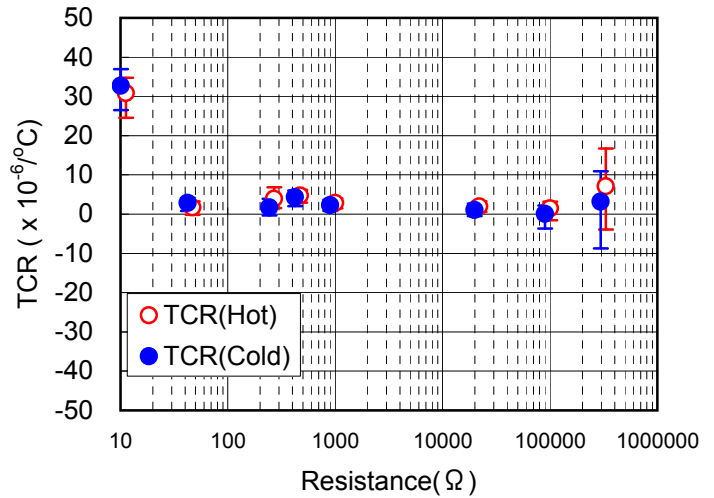
< Specification >

Resistance Range :  $10\Omega \leq R < 47\Omega$

$\pm 50 \times 10^{-6}/^{\circ}\text{C}$

Resistance Range :  $47\Omega \leq R \leq 330\text{k}\Omega$

$\pm 25 \times 10^{-6}/^{\circ}\text{C}$



(21) Board Flex

Printed circuit board : Glass epoxy, t = 1.6mm

Bending depth : 3mm

Bending time : 30 s

n=30

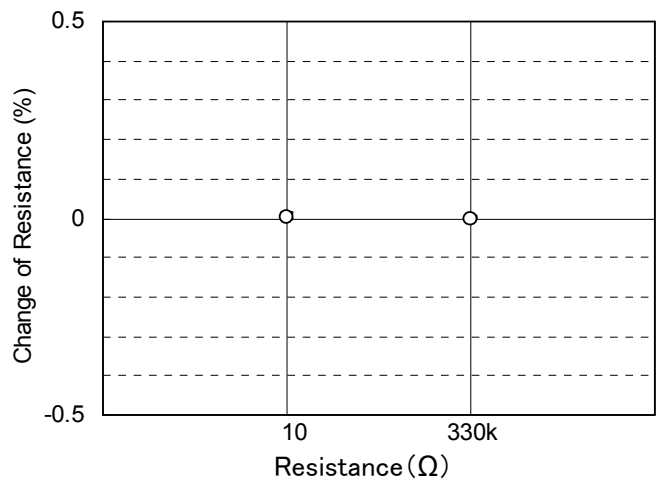
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Tolerance  $\pm 0.5\%$  :  $10\Omega \leq R \leq 330\text{k}\Omega$

$\Delta R : \pm (0.5\% + 0.05\Omega)$

Tolerance  $\pm 0.1\%$  :  $47\Omega \leq R \leq 330\text{k}\Omega$

$\Delta R : \pm (0.1\% + 0.05\Omega)$



(22) Terminal Strength

Apply 5N force from side of chip components for 10s

n=30

< Specification >

Tolerance  $\pm 0.5\%$  :  $10\Omega \leq R \leq 330\text{k}\Omega$

$\Delta R : \pm (0.5\% + 0.05\Omega)$

Tolerance  $\pm 0.1\%$  :  $47\Omega \leq R \leq 330\text{k}\Omega$

$\Delta R : \pm (0.1\% + 0.05\Omega)$

