25-06026

DIGI-KEY CORPORATION

Issue No. : 151RJ00007387
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# PRODUCT SPECIFICATION FOR APPROVAL

Product Description : Thick Film Chip Resistors Low Resistance Value (RoHS)
Product Part Number : ERJ8BW☐＊＊＊＊V

Country of Origin : JAPAN
Applications : Standard electronic equipment

*If you approve this specification, please fill in and sign the below and return 1 copy to us.

Approval No :

Approval Date :

Executed by :

(signature)

Title :
Dept. :

Circuit Components Business Unit
Panasonic Electronic Devices Co., Ltd.

401 Sadamasa-cho,
Fukui City 910-8502 Japan

Phone : +81-776-56-8034
Fax : +81-776-56-3114

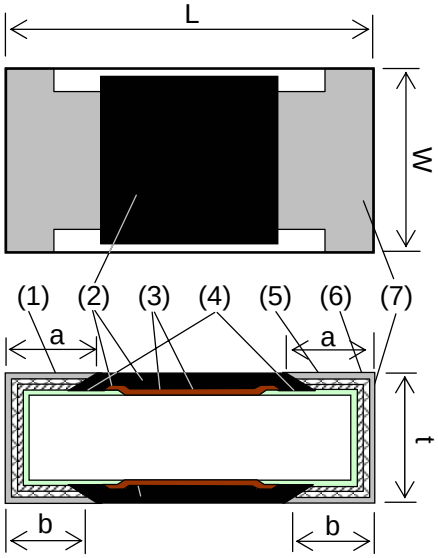
Prepared by : Engineering Section
Contact Person :
Signature S. Oota
Name(Print) S. Oota
Title :

Authorized by :
Signature T. Matsukawa
Name(Print) T. Matsukawa
Title : Manager of Engineering

Panasonic

| Subject | Spec. No. |
|---|---|
| Chip Resistor PRODUCT SPECIFICATION FOR INFORMATION | 151-SRJ-E4330B |
| Part No. ERJ8BW | 9 - 1 |

1. Dimension




(1) Substrate: Alumina
(2) Protective Coating: Resin
(3) Resistive Element: Metal glaze
(4) Inner Termination: Thick film material
(5) Middle Termination 1: Cu Plating
(6) Middle Termination 2: Ni Plating
(7) Outer Termination: Sn Plating

| | L | W | t |
|---|---|---|---|
| Dimension (mm) | 3.20±0.20 | 1.60±0.20 | 0.65±0.10 |

| | a | b |
|---|---|---|
| Dimension (mm) | 1.00±0.20 | 1.00±0.20 |

2. Power Derating Curve

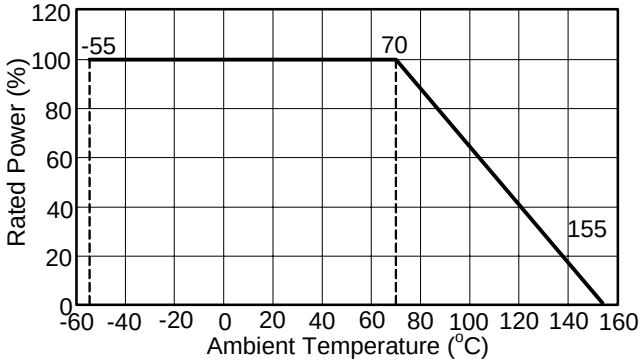



Figure 1

Category temperature range:
-55 °C to +155 °C

3. Ratings

| Item | Rated value (Explanation) |
|---|---|
| Power rating | 0.50 W (When used at ambient temperature above 70 °C, power rating shall be determined in accordance with Figure 1.) |
| Rated voltage | The rated voltage of each resistance should be calculated from the equation below. Rated voltage = $\sqrt{\text{Power rating} \times \text{Resistance value}}$ |
| Resistance tolerance | ± 1% (F), ± 2% (G), ± 5% (J) |
| Resistance range | 0.010 Ω to 0.100 Ω (E-24) |

4. Explanation of Part Number

| E | R | J | 8 | B | W | J | R | 0 | 1 | 6 | V |
|---|---|---|---|---|---|---|---|---|---|---|---|
| (1) | | | (2) | | (3) | (4) | (5) | | | | (6) |

(1) Product code : Thick Film Chip Resistor

(2) Size and power rating : 3.2 mm x 1.6 mm, 0.50W

(3) Resistance range

| Code | Resistance range |
|---|---|
| W | 0.010 Ω to 0.100 Ω |

(4) Resistance Tolerance

| Code | Resistance tolerance |
|---|---|
| F | ± 1% |
| G | ± 2% |
| J | ± 5% |

(5) Resistance value

" R " means decimal point, and the other three digits are significant figures of resistance value.

ex) R016 → 0.016Ω

(6) Packaging configuration

| Code | Packaging configuration |
|---|---|
| V | Taping (5,000 pcs/reel) |

5. Appearance & Construction

| Item | Explanation |
|---|---|
| Appearance & Construction | 1. The resistive element should be covered with protective coating that does not fade easily. The surface of coating should avoid unevenness, flaw, pinhole and discoloration.<br>2. The electrode should be printed uniformly, as shown in the dimensions. The plating should not fade easily, and should avoid unevenness, flaw, pinhole, projection and discoloration.<br>3. The electrode should be connected electrically, mechanically to resistive element.<br>4. Dimensions of the substrate should be as in the list and it should not have chipping, flaw, flash and crack. Details of appearance criteria shall be as described in attached sheet. |

As far as there shall not designation especially, the following tests and measurement shall be operated under the following conditions.

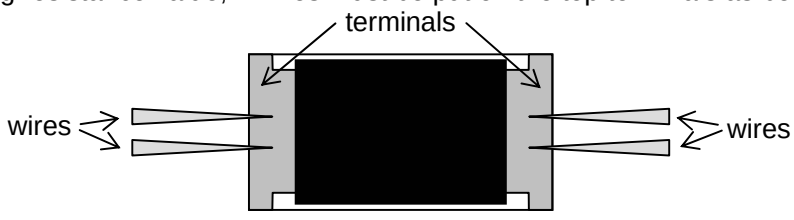
Normal temperature: 5 °C to 35 °C

Normal humidity: 45 %RH to 85 %RH

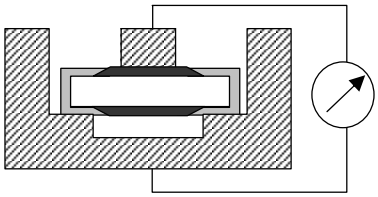
Normal atmospheric pressure: 86 k Pa to 106 k Pa

<Measuring method>

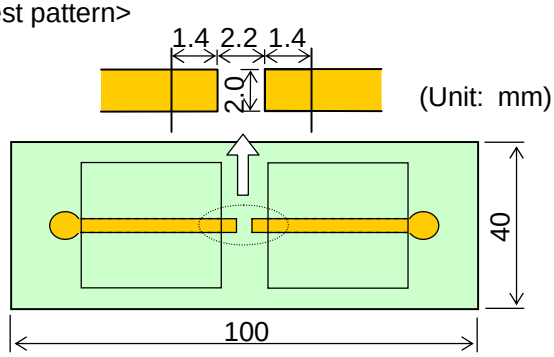
In measuring resistance value, 4 wires must be put on the top terminals as below.



6. Performance Specification

| Item | Specification | Test method (JIS-C5201-1) |
|---|---|---|
| DC resistance | DC resistance value shall be within the specified tolerance. | At 20 °C, 65%RH |
| Temperature coefficient of resistance (TCR) | ± 200 x $10^{-6}$/°C (0.01Ω to 0.043Ω)<br>± 100 x $10^{-6}$/°C (0.047Ω to 0.100Ω) | Natural resistance change per temperature degree centigrade.<br>TCR=$(R_2-R_1)x10^6/R_1(t_2-t_1)$ (x$10^{-6}$/°C)<br>$R_1$: Resistance value at reference temperature ($t_1$)<br>$R_2$: Resistance value at test temperature ($t_2$)<br>$t_1$: 25 °C , $t_2$: 125 °C |
| Short time overload | ΔR: ± (2% +0.005 Ω) | Resistors shall be applied 2.5 times the rated voltage for 5 s. |
| Intermittent overload | ΔR: ± (5% +0.005 Ω) | Resistors shall be subjected to 10,000 cycles of 2.0 times the rated voltage applied for 1 s with pause of 25 s between applying. |
| Dielectric withstanding | No evidence of flashover, mechanical damage, arcing or insulation breakdown | AC 200V between substrate and termination for 1 min.<br>  <br>AC powersupply or Insulation resistance meter |
| Insulation resistance | Min. 1,000 MΩ | After applying DC 200V to the resistor, insulation resistance shall be measured. |

7. Mechanical Characteristics

| Item | Specifications | Test method (JIS-C5201-1) |
|---|---|---|
| Bending strength | ΔR: ± (1% +0.005 Ω) and no mechanical damage. | Substrate: Glass epoxy (t=1.6 mm)<br>Span: 90mm<br>Bending distance: 3mm (10 s)<br><Test pattern><br>  <br> |
| Solderability | Termination should be covered uniformly with solder (Min. 95% coverage) | Resistors shall be dipped in the melted solder bath at 235 °C ± 5 °C for 2 s ± 0.5 s. Flux shall be removed from the surface of termination with clean organic solvent. |
| Resistance to soldering heat | ΔR: ± (1% +0.005 Ω) | Resistors shall be dipped in the melted solder bath at 270 °C ± 3 °C for 10 s ± 1 s. |

| Item | Specification | Test method (JIS-C5201-1) |
|---|---|---|
| Vibration | ΔR: ± (1% +0.005 Ω) | Resistors shall be subjected to a single vibration having as double amplitude of 1.5 mm in 3 directions perpendicular one another for 2 h each (6 h in total). The vibration frequency shall be varied uniformly from 10 Hz to 55 Hz, and return to 10 Hz traversing for 1 min. |
| Resistance to solvent | ΔR: ± (0.5% +0.005 Ω) and without distinct deformation in appearance | Solvent solution: Isopropyl alcohol<br>(1) Dipping 10 h ± 1 h, dry in room condition for 30 min ± 10 min.<br>(2) Ultrasonic wave washing 5 min ± 1 min (0.3W/cm, 28kHz), dry in room condition for 30 min ± 10 min. |

8. Environmental Test

| Item | Specification | Test method (JIS-C5201-1) |
|---|---|---|
| Low temperature exposure | ΔR: ± (1% +0.005 Ω) | Resistors shall be exposed at -55 °C ± 3 °C with no load for 1000 h +48/-0 h. |
| High temperature exposure | ΔR: ± (1% +0.005 Ω) | Resistors shall be exposed at 125 °C ± 3 °C with no load for 1000 h +48/-0 h. |
| Temperature cycling | ΔR: ± (1% +0.005 Ω) | Resistors shall be tested for 5 cycles continuously in accordance with the following duty cycle. |

| Step | Temperature (°C) | Time (min.) |
|---|---|---|
| 1 | -55 ± 3 | 30 |
| 2 | Room temperature | Max. 3 |
| 3 | +125 ± 3 | 30 |
| 4 | Room temperature | Max.3 |

| | | |
|---|---|---|
| Humidity (Steady state) | ΔR: ± (1% +0.005 Ω) | Resistors shall be exposed at 60 °C ± 2 °C and 90% to 95% relative hummidity in a humidity test chamber for 1000 h +48/-0 h. |
| Load Life | ΔR: ± (3% +0.005 Ω) | Resistors shall be operated at DC rated voltage (1.5 h "ON", 0.5 h "OFF") for 1000 h +48/-0 h in a test chamber controlled at 70 °C ± 2 °C. |
| Load life in Hhumidity | ΔR: ± (3% +0.005 Ω) | Resistors shall be operated at DC rated voltage (1.5 h “ON”, 0.5 h “OFF”) for 1000 h +48/-0 h in a test chamber controlled at 60 °C ± 2 °C and at 90 % to 95% in relative hummidity. |

9. Resistance value marking

No marking

10. Common Precautions in Handling Resistors

⚠ Notice for use

(1) This specification shows the quality and performance of a unit component. Before adoption, be sure to evaluate and verify the product mounting it in your product.
(2) We take no responsibility for troubles caused by the product usage that is not specified in this specification.
(3) Use fail-safe design and ensure safety by carrying out the following items in cases where it is forecast that the failure of the product gives serious damage to something important like human life, for instant in traffic transportation equipment (trains, cars, traffic signal equipment, etc.), medical equipment, aerospace equipment, electric heating appliances, combustion and gas equipment, rotating equipment, disaster and crime preventive equipment.
  * Ensure safety as the system by setting protective circuits and protective equipment.
  * Ensure safety as the system by s etting such redundant circuits as do not cause danger by a single failure.
(4) When a dogma shall be occurred about safety for this product, be sure to inform us rapidly, operate your technical examination.
(5) The product is designed to use in general standard applications of general electric equipment (AV products, household electric appliances, office equipment, information and communication equipment, etc.); hence, it do not take the use under the following special environments into consideration. Accordingly, the use in the following special environments, and such environmental conditions may affect the performance of the product; prior to use, verify the performance, reliability, etc. thoroughly.
  1) Use in liquids such as water, oil, chemical, and organic solvent.
  2) Use under direct sunlight, in outdoor or in dusty atmospheres.
  3) Use in places full of corrosive gases such as sea breeze, $Cl_2$, $H_2S$, $NH_3$, $SO_2$, and $NO_X$.
  4) Use in environment with large static electricity or strong electromagnetic waves.
  5) Where the product is close to a heating component, and where an inflammable such as a polyvinyl chloride wire is arranged close to the product.
  6) Where the resistor is sealed or coated with resin, etc.
  7) Where water or a water-soluble detergent is used in cleaning free soldering and in flux cleaning af ter soldering (Pay particular attention to soluble flux.)
  8) Use in such a place where the product is wetted due to dew condensation.
(6) If transient load (heavy load in a short time) like pulse is expected to be applied, carry out evaluation and confirmation test with resistors actually mounted on your own board. When the load of more than rated power is applied under the load condition at steady state, it may impair performance and/or reliability of resistor. Never exceed the rated power. When the product shall be used under special condition, be sure to ask us in advance.
(7) Halogen type (Chlorine type, Bromine type, etc.) or other high-activity flux is not recommended as the residue may affect performance or reliability of resistors.
(8) When soldering with soldering iron, never touch the body of the chip resistor with a tip of the soldering iron. When using a soldering iron with a tip at high temperature, solder for a time as short as possible. (3 s or less up to 350 $^{o}$C)
(9) Avoid physical shock to the resistor and nipping of the resistor with hard tool (a pair of pliers or tweezers) as it may damage protective film or the body of resistor and may affect resistor's performance.
(10) Avoid immersion of chip resistor in solvent for long time. Use solvent after the effect of im mersion is confirmed.
(11) When using the mounting machine with the pushing up pin, be sure to confirm whether to damage protective coating on the bottom side.
(12) Please confirm whether the chip standing is occurred and please confirm the selfalignment, when you do silk-plinting on the mounted place.

11. Storage Method

If the product is stored in the following environments and conditions, the performance and solderability may be badly affected, avoid the storage in the following environments.

(1) Storage in places full of corrosive gases such as sea breeze, $Cl_2$, $H_2S$, $NH_3$, $SO_2$, and $NO_X$.

(2) Storage in places exposed to direct sunlight.

(3) Storage in places outside the temperature range of 5 $^{o}$C to 35 $^{o}$C and humidity range of 45 %RH to 85 %RH.

(4) Storage over a year after our delivery (This item also applies to the case where the storage method specified in item (1) to (3) has been followed.).

12. Laws and Regulations

(1) This product has not been manufactured with any ozone-depleting chemical controlled under the Montreal Protocol.

(2) This product complies with the RoHS Directive (Restriction of the use of certain Hazardous Substances in electrical and electronic equipment (DIRECTIVE 2002/95/EC)).

(3) All materials used in this part are registered material under the Law Concerning the Examination and Regulation of Manufacturs, etc. of Chemical substances.

(4) All the materials used in this part contain no brominated materials of $PBBO_S$ or $PBB_S$ as the flame-retardant.

(5) If you need the notice by letter of “A preliminary judgement on the laws of Japan foreign exchange and foreign trade control”, be sure to let us know.

13. Production Site

Country: Japan

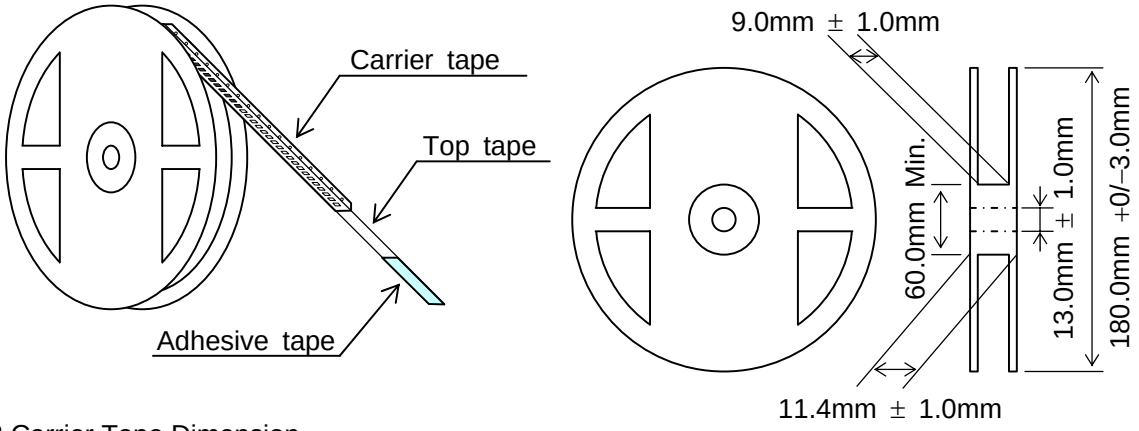
Plant: Panasonic Electronic Devices Fukui Co., Ltd.

14. Taped and Reel Package

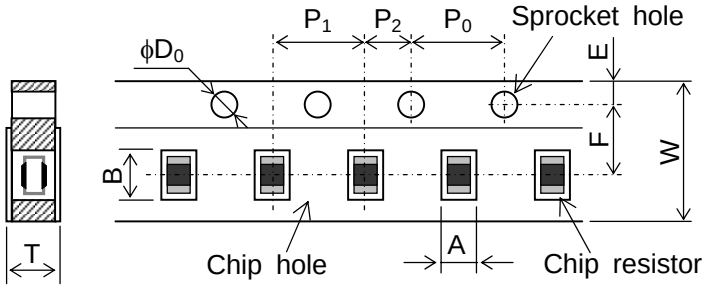
14-1. Physical Dimensions

Structure and dimensions of reel shall be as shown in the figure below.

Inaccordance with EIAJ ET-7200.




14-2 Carrier Tape Dimension




unit: mm

| | A | B | W | F | E |
|---|---|---|---|---|---|
| Dimension (mm) | 2.00±0.15 | 3.60±0.20 | 8.00±0.20 | 3.50±0.05 | 1.75±0.10 |

| | $P_1$ | $P_2$ | $P_0$ | $\phi D_0$ | T |
|---|---|---|---|---|---|
| Dimension (mm) | 4.00±0.10 | 2.00±0.05 | 4.00±0.10 | $1.50^{+0.10}_{-0}$ | 0.84±0.05 |

14-3 Specifications

14-3-1 Taping

(1) Minimum Bending Radius

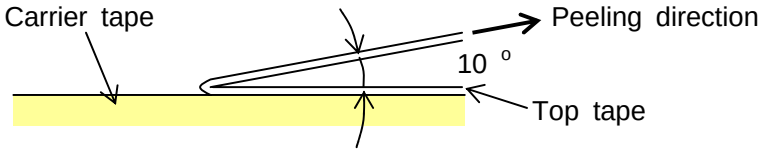
When carrier tape shall be bent by minimum bending radius (15mm), no defection of chip and no break of carrier tape. However minimum bending radius shall be tested for 1 time.

(2) Resistance to climate of top tape

When it shall be exposed at 60 $^{o}$C, 90 %RH to 95 %RH for 120 h, no exfoliation of top tape.

(3) When the test shall be operated with the below conditions, peel strength should be 0.049 N to 0.49 N, should not have flash and tear after peeling.

(Test Method)



14-3-2 Quantity in Taping: 5,000 pcs./reel

14-3-3 Tape packaging

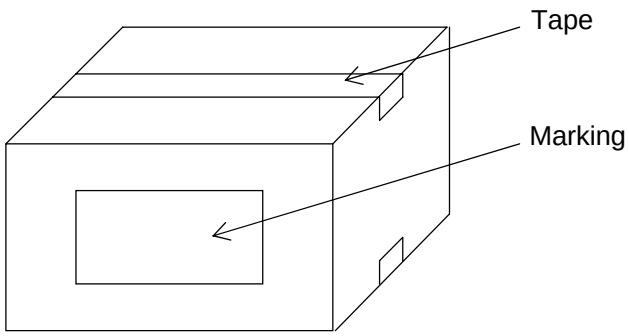
(1) Resistance side shall be facing upward.

(2) Chip resistor shall not be sticking to top tape and bottom tape.

(3) Chip resistor shall be easy to take out from carrier tape and chip hole or sprocket hole shall not have flash and break.

14-4 Outer Packaging

Quantity: 20 reels (Max. 100,000 pcs.)




* When taping shall not reach Max. or quantity, the remaining empty space shall be buried with buffer material.
* When the quantity shall be few, alternative packaging methods may be used. No problem must occur during the exportation of the product.

14-5 Marking

At least production country is displayed in English.

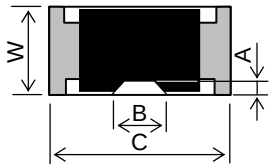
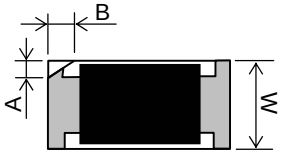
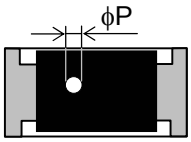
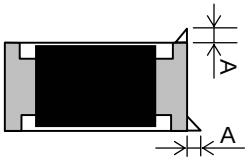
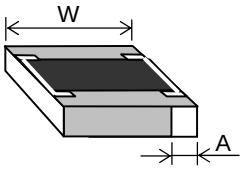
(1) Side of reel (Marking shall be on one side)

1)Part name, 2)Part number, 3)Quantity, 4)Lot number, 5)Maker name, 6) Poduction country

(2)Packaging box

1)Customer name, 2)Part name, 3)Part number, 4)Customer part number, 5)Quantity.
6)Maker name, 7)Poduction country

15. Appearance Quality Criteria

| Item | Figure | Appearance quality criteria | Remark |
|---|---|---|---|
| Protective coating chipping |   | A ≤ W/4<br>B ≤ C/2 | Chipping on both sides shall be considered defective |
| Terminal chipping |   | A ≤ W/4<br>B ≤ Terminal width | |
| Pin hole |   | 1 pin hole / chip resistor<br>ϕP ≤ 0.2 mm | Pin hole penetrates the resistive material. |
| Flash |   | A ≤ 0.15 mm | |
| Top terminal lacking |   | A ≤ W/4 | |
| Side terminal lacking |   | A ≤ W/4 | |