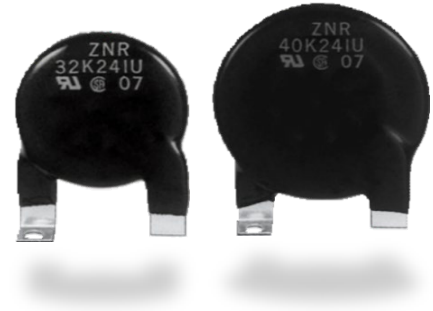


## Varistors (ZNR Surge Absorber)

### CK type (UL and CSA Recognized)

Varistors (ZNR Surge Absorber) with Tabs is a heavy duty type ZNR with very unique tab terminals which bring forth a higher reliability. These tabs are used as electrical connecting terminals and also its mounting legs. This type of ZNR is meant for applications in power supplies or ransient voltage surge suppressor units where large surge current or high surge energy absorption is required.



#### Features

- UL and CSA recognized components
- High energy handling capability (210 to 750 joules)
- Large withstanding peak current (20 to 25 kA, 8/20  $\mu$ s, 2 times)
- Common terminals for electrical connection and mounting
- RoHS compliant

#### Recommended applications

- Power suppliers for OA, FA, telecommunication or industrial equipment
- Power strips
- Transient voltage surge suppressor units

#### Related standards

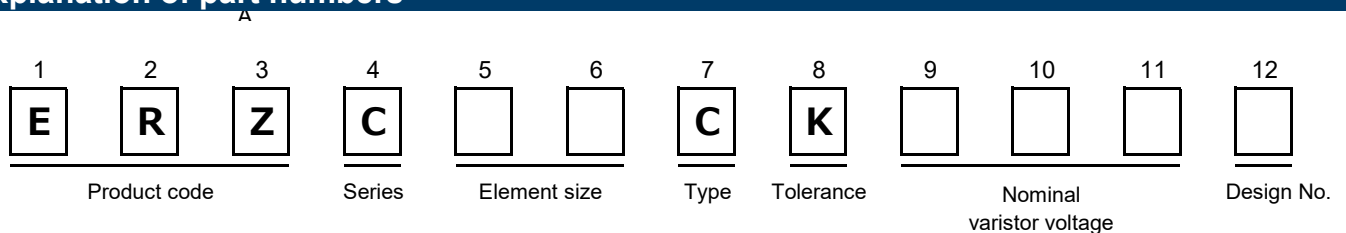
| Standard No. | UL1449                   | CSA C22.2 No.269.5                             |
|--------------|--------------------------|------------------------------------------------|
| Title        | Surge protective devices | Surge protective devices - Type 5 – Components |

- Each type designation is not registered by Part Number.  
Please contact us for further questions regarding type designation.

Note : Ask our factory for Product Specification before use.

■ As for handling precautions and minimum quantity / Packing unit please see related information.

#### Explanation of part numbers



## Ratings and characteristics

●Operating temperature range : -40 to 85 °C

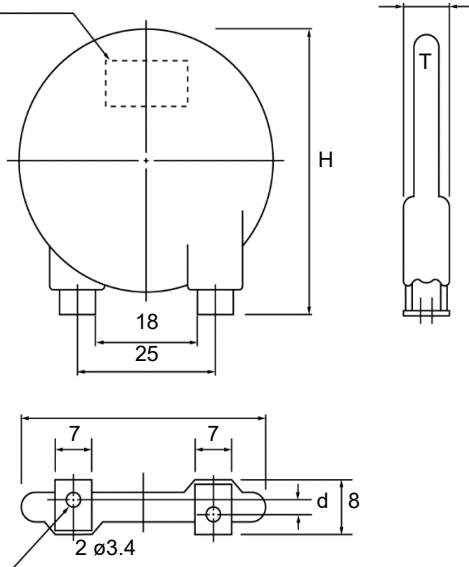
●Operating temperature range : -40 to 125 °C

| Part No.<br>(UL/CSA<br>Recognized) | Type<br>designation | Varistor<br>voltage<br>at 1m A<br>(V) | Maximum<br>allowable<br>voltage |        | Maximum<br>clamping<br>voltage |                    | Maximum<br>energy<br>(2ms) | Maximum<br>peak current<br>(8/20 μs) |         |
|------------------------------------|---------------------|---------------------------------------|---------------------------------|--------|--------------------------------|--------------------|----------------------------|--------------------------------------|---------|
|                                    |                     |                                       | AC rms (V)                      | DC (V) | VXA (V)                        | I <sub>p</sub> (A) | 1 time                     | 1 time                               | 2 times |
| ERZC32CK201W                       | 32K201U             | 200 (185 to 225)                      | 130                             | 170    | 340                            | 200                | 210                        | 25                                   | 20      |
| ERZC32CK241W                       | 32K241U             | 240 (216 to 264)                      | 150                             | 200    | 395                            | 200                | 240                        | 25                                   | 20      |
| ERZC32CK271W                       | 32K271U             | 270 (247 to 303)                      | 175                             | 225    | 455                            | 200                | 255                        | 25                                   | 20      |
| ERZC32CK361W                       | 32K361U             | 360 (324 to 396)                      | 230                             | 300    | 595                            | 200                | 325                        | 25                                   | 20      |
| ERZC32CK391W                       | 32K391U             | 390 (351 to 429)                      | 250                             | 320    | 650                            | 200                | 350                        | 25                                   | 20      |
| ERZC32CK431W                       | 32K431U             | 430 (387 to 473)                      | 275                             | 350    | 710                            | 200                | 400                        | 25                                   | 20      |
| ERZC32CK471W                       | 32K471U             | 470 (423 to 517)                      | 300                             | 385    | 775                            | 200                | 405                        | 25                                   | 20      |
| ERZC32CK511W                       | 32K511U             | 510 (459 to 561)                      | 320                             | 415    | 845                            | 200                | 405                        | 25                                   | 20      |
| ERZC32CK621W                       | 32K621U             | 620 (558 to 682)                      | 385                             | 505    | 1025                           | 200                | 415                        | 25                                   | 20      |
| ERZC32CK681W                       | 32K681U             | 680 (612 to 748)                      | 420                             | 560    | 1120                           | 200                | 450                        | 25                                   | 20      |
| ERZC32CK751W                       | 32K751U             | 750 (675 to 825)                      | 460                             | 615    | 1240                           | 200                | 500                        | 25                                   | 20      |
| ERZC32CK781W                       | 32K781U             | 780 (702 to 858)                      | 485                             | 640    | 1290                           | 200                | 520                        | 25                                   | 20      |
| ERZC32CK821W                       | 32K821U             | 820 (738 to 902)                      | 510                             | 670    | 1355                           | 200                | 545                        | 25                                   | 20      |
| ERZC32CK911W                       | 32K911U             | 910 (819 to 1001)                     | 550                             | 745    | 1500                           | 200                | 600                        | 25                                   | 20      |
| ERZC32CK951W                       | 32K951U             | 950 (855 to 1045)                     | 575                             | 765    | 1570                           | 200                | 600                        | 25                                   | 20      |
| ERZC40CK201W                       | 40K201U             | 200 (185 to 225)                      | 130                             | 170    | 340                            | 250                | 260                        | 30                                   | 25      |
| ERZC40CK241W                       | 40K241U             | 240 (216 to 264)                      | 150                             | 200    | 395                            | 250                | 300                        | 30                                   | 25      |
| ERZC40CK271W                       | 40K271U             | 270 (247 to 303)                      | 175                             | 225    | 455                            | 250                | 340                        | 30                                   | 25      |
| ERZC40CK361W                       | 40K361U             | 360 (324 to 396)                      | 230                             | 300    | 595                            | 250                | 405                        | 30                                   | 25      |
| ERZC40CK391W                       | 40K391U             | 390 (351 to 429)                      | 250                             | 320    | 650                            | 250                | 435                        | 30                                   | 25      |
| ERZC40CK431W                       | 40K431U             | 430 (387 to 473)                      | 275                             | 350    | 710                            | 250                | 500                        | 30                                   | 25      |
| ERZC40CK471W                       | 40K471U             | 470 (423 to 517)                      | 300                             | 385    | 775                            | 250                | 505                        | 30                                   | 25      |
| ERZC40CK511W                       | 40K511U             | 510 (459 to 561)                      | 320                             | 415    | 845                            | 250                | 505                        | 30                                   | 25      |
| ERZC40CK621W                       | 40K621U             | 620 (558 to 682)                      | 385                             | 505    | 1025                           | 250                | 515                        | 30                                   | 25      |
| ERZC40CK681W                       | 40K681U             | 680 (612 to 748)                      | 420                             | 560    | 1120                           | 250                | 560                        | 30                                   | 25      |
| ERZC40CK751W                       | 40K751U             | 750 (675 to 825)                      | 460                             | 615    | 1240                           | 250                | 625                        | 30                                   | 25      |
| ERZC40CK781W                       | 40K781U             | 780 (702 to 858)                      | 485                             | 640    | 1290                           | 250                | 650                        | 30                                   | 25      |
| ERZC40CK821W                       | 40K821U             | 820 (738 to 902)                      | 510                             | 670    | 1355                           | 250                | 680                        | 30                                   | 25      |
| ERZC40CK911W                       | 40K911U             | 910 (819 to 1001)                     | 550                             | 745    | 1500                           | 250                | 750                        | 30                                   | 25      |
| ERZC40CK951W                       | 40K951U             | 950 (855 to 1045)                     | 575                             | 765    | 1570                           | 250                | 750                        | 30                                   | 25      |

## Dimensions (not to scale)

Unit : mm

- ZNR
- Abbreviation of Part No.
- Date code

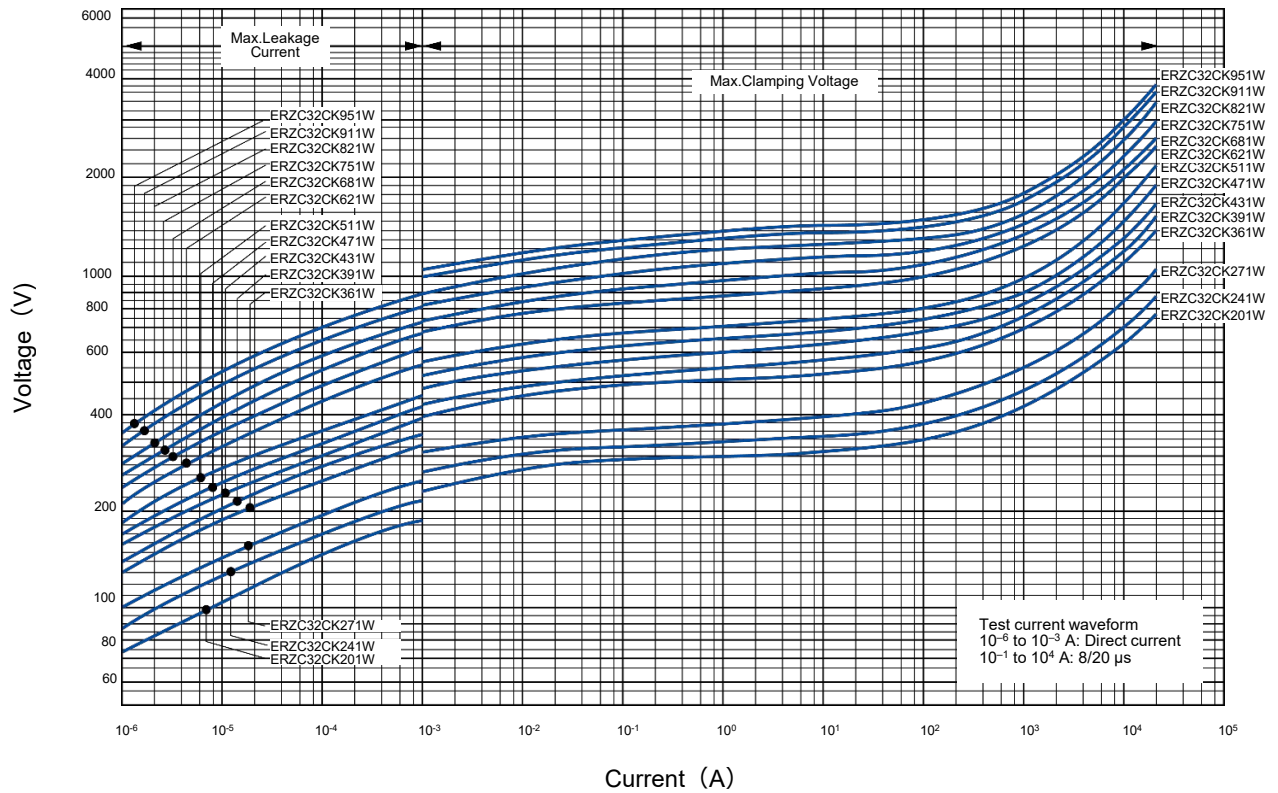


| Part No.<br>(UL/CSA recognized) | Type designation | D max. | H max. | T max. | d       |
|---------------------------------|------------------|--------|--------|--------|---------|
| ERZC32CK201W                    | 32K201U          | 36     | 46     | 7.5    | 5.7±1.0 |
| ERZC32CK241W                    | 32K241U          |        |        | 7.5    | 5.4±1.0 |
| ERZC32CK271W                    | 32K271U          |        |        | 8.5    | 5.2±1.0 |
| ERZC32CK361W                    | 32K361U          |        |        | 9.0    | 4.6±1.0 |
| ERZC32CK391W                    | 32K391U          |        |        | 9.0    | 4.4±1.0 |
| ERZC32CK431W                    | 32K431U          |        |        | 9.0    | 4.1±1.0 |
| ERZC32CK471W                    | 32K471U          |        |        | 9.7    | 3.9±1.0 |
| ERZC32CK511W                    | 32K511U          |        |        | 9.7    | 4.5±1.0 |
| ERZC32CK621W                    | 32K621U          |        |        | 9.7    | 3.9±1.0 |
| ERZC32CK681W                    | 32K681U          |        |        | 9.7    | 3.6±1.0 |
| ERZC32CK751W                    | 32K751U          |        |        | 10.5   | 3.3±1.0 |
| ERZC32CK781W                    | 32K781U          |        |        | 10.5   | 3.1±1.0 |
| ERZC32CK821W                    | 32K821U          |        |        | 10.5   | 2.9±1.0 |
| ERZC32CK911W                    | 32K911U          |        |        | 11.5   | 2.5±1.0 |
| ERZC32CK951W                    | 32K951U          |        |        | 11.5   | 2.3±1.0 |
| ERZC40CK201W                    | 40K201U          | 44     | 50     | 7.5    | 5.7±1.0 |
| ERZC40CK241W                    | 40K241U          |        |        | 7.5    | 5.4±1.0 |
| ERZC40CK271W                    | 40K271U          |        |        | 8.5    | 5.2±1.0 |
| ERZC40CK361W                    | 40K361U          |        |        | 9.0    | 4.6±1.0 |
| ERZC40CK391W                    | 40K391U          |        |        | 9.0    | 4.4±1.0 |
| ERZC40CK431W                    | 40K431U          |        |        | 9.0    | 4.1±1.0 |
| ERZC40CK471W                    | 40K471U          |        |        | 9.7    | 3.9±1.0 |
| ERZC40CK511W                    | 40K511U          |        |        | 9.7    | 4.5±1.0 |
| ERZC40CK621W                    | 40K621U          |        |        | 9.7    | 3.9±1.0 |
| ERZC40CK681W                    | 40K681U          |        |        | 9.7    | 3.6±1.0 |
| ERZC40CK751W                    | 40K751U          |        |        | 10.5   | 3.3±1.0 |
| ERZC40CK781W                    | 40K781U          |        |        | 10.5   | 3.1±1.0 |
| ERZC40CK821W                    | 40K821U          |        |        | 10.5   | 2.9±1.0 |
| ERZC40CK911W                    | 40K911U          |        |        | 11.5   | 2.5±1.0 |
| ERZC40CK951W                    | 40K951U          |        |        | 11.5   | 2.3±1.0 |

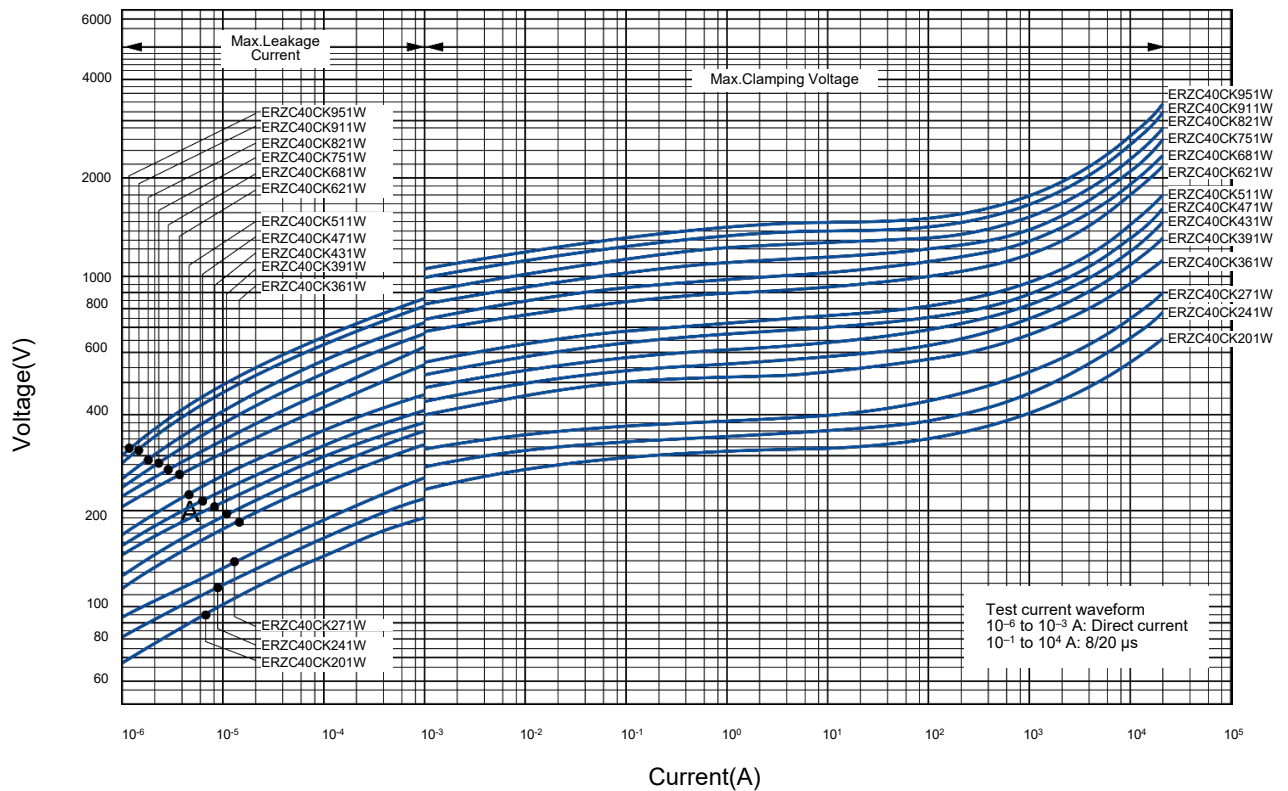
## Typical characteristics

### Voltage vs. Current

(ERZC32CK201W to ERZC32CK951W)



(ERZC40CK201W to ERZC40CK951W)



## Application note for safety standards

- Approvals products lists in "Reference Guide to Standard Products."
- UL and VDE : Registered in "Type name", it isn't registered in "Panasonic Part No."
- CQC : Registered in "Panasonic Part No."
- "Rated Voltages" are specified for UL recognized components in list shown below.

## The AC rated voltage and maximum allowable voltage

| Part No.<br>(UL/CSA recognized) | Maximum allowable voltage |          | Rated voltage (Vrms) |                    |
|---------------------------------|---------------------------|----------|----------------------|--------------------|
|                                 | AC rms ( V )              | DC ( V ) | UL1449               | CSA C22.2 No.269.5 |
| ERZC32CK201W                    | 130                       | 170      | 118                  | 118                |
| ERZC32CK241W                    | 150                       | 200      | 136                  | 136                |
| ERZC32CK271W                    | 175                       | 225      | 159                  | 159                |
| ERZC32CK361W                    | 230                       | 300      | 209                  | 209                |
| ERZC32CK391W                    | 250                       | 320      | 227                  | 227                |
| ERZC32CK431W                    | 275                       | 350      | 250                  | 250                |
| ERZC32CK471W                    | 300                       | 385      | 272                  | 272                |
| ERZC32CK511W                    | 320                       | 415      | 291                  | 291                |
| ERZC32CK621W                    | 385                       | 505      | 350                  | 350                |
| ERZC32CK681W                    | 420                       | 560      | 381                  | 381                |
| ERZC32CK751W                    | 460                       | 615      | 418                  | 418                |
| ERZC32CK781W                    | 485                       | 640      | 440                  | 440                |
| ERZC32CK821W                    | 510                       | 670      | 463                  | 463                |
| ERZC32CK911W                    | 550                       | 745      | 500                  | 500                |
| ERZC32CK951W                    | 575                       | 765      | 522                  | 522                |
| ERZC40CK201W                    | 130                       | 170      | 118                  | 118                |
| ERZC40CK241W                    | 150                       | 200      | 136                  | 136                |
| ERZC40CK271W                    | 175                       | 225      | 159                  | 159                |
| ERZC40CK361W                    | 230                       | 300      | 209                  | 209                |
| ERZC40CK391W                    | 250                       | 320      | 227                  | 227                |
| ERZC40CK431W                    | 275                       | 350      | 250                  | 250                |
| ERZC40CK471W                    | 300                       | 385      | 272                  | 272                |
| ERZC40CK511W                    | 320                       | 415      | 291                  | 291                |
| ERZC40CK621W                    | 385                       | 505      | 350                  | 350                |
| ERZC40CK681W                    | 420                       | 560      | 381                  | 381                |
| ERZC40CK751W                    | 460                       | 615      | 418                  | 418                |
| ERZC40CK781W                    | 485                       | 640      | 440                  | 440                |
| ERZC40CK821W                    | 510                       | 670      | 463                  | 463                |
| ERZC40CK911W                    | 550                       | 745      | 500                  | 500                |
| ERZC40CK951W                    | 575                       | 765      | 522                  | 522                |

## Performance characteristics

| Characteristics                      |                                      |                                                                                                                                                                                                                              | Test methods/description                                                                                                                                                                                                                                                        |                                               | Specifications                                                                  |
|--------------------------------------|--------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------|---------------------------------------------------------------------------------|
| Standard test condition              |                                      |                                                                                                                                                                                                                              | Electrical measurements (initial/after tests) shall be conducted at temperature of 5 to 35 °C, relative humidity of maximum 85 %.                                                                                                                                               |                                               | —                                                                               |
| Electrical                           | Varistor voltage                     |                                                                                                                                                                                                                              | The voltage between two terminals with the specified measuring current 1mA DC applied is called V <sub>1</sub> or V <sub>1mA</sub> . The measurement shall be made as fast as possible to avoid heat affection.                                                                 |                                               | To meet the specified value                                                     |
|                                      | Maximum allowable voltage            |                                                                                                                                                                                                                              | The maximum sinusoidal wave voltage (rms) or the maximum DC voltage that can be applied continuously.                                                                                                                                                                           |                                               |                                                                                 |
|                                      | Clamping voltage                     |                                                                                                                                                                                                                              | The maximum voltage between two terminals with the specified standard impulse current (8/20 μs).                                                                                                                                                                                |                                               |                                                                                 |
|                                      | Rated power                          |                                                                                                                                                                                                                              | The maximum power that can be applied within the specified ambient temperature.                                                                                                                                                                                                 |                                               |                                                                                 |
|                                      | Maximum energy                       |                                                                                                                                                                                                                              | The maximum energy within the varistor voltage change of ±10 % when one impulse of 2 ms is applied.                                                                                                                                                                             |                                               |                                                                                 |
|                                      | Maximum peak current                 | 2 times                                                                                                                                                                                                                      | The maximum current within the varistor voltage change of ±10 % with the standard impulse current (8/20 μs) applied two times with an interval of 5 minutes.                                                                                                                    |                                               |                                                                                 |
| 1 time                               |                                      | The maximum current within the varistor voltage change of ±10 % with the standard impulse current (8/20 μs) applied one time.                                                                                                |                                                                                                                                                                                                                                                                                 |                                               |                                                                                 |
| Mechanical                           | Robustness of terminations (Tensile) |                                                                                                                                                                                                                              | After gradually applying the load of 19.6 N (2 kgf) and keeping the unit fixed for 10 seconds, the terminal shall be visually examined for any damage.                                                                                                                          |                                               | No remarkable damage                                                            |
|                                      | Vibration                            |                                                                                                                                                                                                                              | After repeatedly applying a single harmonic vibration (amplitude: 0.35 mm): double amplitude: 0.7 mm with 1 minute vibration frequency cycles (10 Hz to 55 Hz to 10 Hz) to each of three perpendicular directions for 2 hours. Thereafter, the unit shall be visually examined. |                                               | No remarkable damage                                                            |
|                                      | Solderability                        |                                                                                                                                                                                                                              | After dipping the terminal to a depth of approximately 3 mm from the body in a soldering bath of 230±5 °C for 5.0±0.5 seconds, the terminal shall be visually examined.                                                                                                         |                                               | Approximately 95 % of the terminals shall be covered with new solder uniformly. |
|                                      | Resistance to soldering heat         |                                                                                                                                                                                                                              | The terminal shall be dipped into a soldering bath having a temperature of 350±10 °C to a point 4.0±0.8 mm from the body of the unit and then be held there for 3.0±0.5 seconds. The change of Vc and mechanical damage shall be examined.                                      |                                               | ΔV <sub>1 mA</sub> /V <sub>1 mA</sub> ≤ ±5 %                                    |
| Environmental                        | Dry heat/ high temperature storage   |                                                                                                                                                                                                                              | The specimen shall be subjected to 125±2 °C for 500 hours in a thermostatic bath without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of Vc shall be measured.                                                            |                                               | ΔV <sub>1 mA</sub> /V <sub>1 mA</sub> ≤ ±5 %                                    |
|                                      | Damp heat/humidity (Steady State)    |                                                                                                                                                                                                                              | The specimen shall be subjected to 40±2 °C, 90 to 95 %RH for 1000 hours without load and then stored at room temperature and humidity for one to two hours. Thereafter, the change of Vc shall be measured.                                                                     |                                               |                                                                                 |
|                                      | Temperature cycle                    |                                                                                                                                                                                                                              | The temperature cycle shown below shall be repeated five times and then stored at room temperature and humidity for one to two hours. The change of Vc and mechanical damage shall be examined.                                                                                 |                                               | ΔV <sub>1 mA</sub> /V <sub>1 mA</sub> ≤ ±5 %<br>No remarkable damage            |
|                                      |                                      |                                                                                                                                                                                                                              | Step                                                                                                                                                                                                                                                                            | Temperature (°C)                              |                                                                                 |
| 1                                    |                                      |                                                                                                                                                                                                                              | −25±3                                                                                                                                                                                                                                                                           | 30 <sup>+3</sup> <sub>..0</sub>               |                                                                                 |
| 2                                    |                                      |                                                                                                                                                                                                                              | Room Temp.                                                                                                                                                                                                                                                                      | 3 max.                                        |                                                                                 |
| 3                                    |                                      |                                                                                                                                                                                                                              | 85±2                                                                                                                                                                                                                                                                            | 30 <sup>+3</sup> <sub>..0</sub>               |                                                                                 |
|                                      |                                      | 4                                                                                                                                                                                                                            | Room Temp.                                                                                                                                                                                                                                                                      | 3 max.                                        |                                                                                 |
| Dry heat load/ high temperature load |                                      | After being continuously applied the Maximum Allowable Voltage at 85±2 °C for 500 hours, the specimen shall be stored at room temperature and humidity for one to two hours. Thereafter, the change of Vc shall be measured. |                                                                                                                                                                                                                                                                                 | ΔV <sub>1 mA</sub> /V <sub>1 mA</sub> ≤ ±10 % |                                                                                 |

## Minimum quantity / Packing unit

| Product                         | Series / Type |                       | Part number  | Minimum quantity / Packing unit | Packing quantity in carton | Carton (about) L×W×H (mm) |
|---------------------------------|---------------|-----------------------|--------------|---------------------------------|----------------------------|---------------------------|
| "ZNR" Transient/surge absorbers | CK type       | UL and CSA recognized | ERZC□□CK□□□W | 10                              | 200                        | 320×430×65                |

Part No., quantity and country of origin are designated on outer packages in English.

※ Please contact local sales office about packing specifications.

## Safety and Legal Matters to Be Observed

### Product specifications and applications

- Please be advised that this product and product specifications are subject to change without notice for improvement purposes. Therefore, please request and confirm the latest delivery specifications that explain the specifications in detail before the final design, or purchase or use of the product, regardless of the application. In addition, do not use this product in any way that deviates from the contents of the company's delivery specifications.
- Unless otherwise specified in this catalog or the product specifications, this product is intended for use in general electronic equipment (AV products, home appliances, commercial equipment, office equipment, information and communication equipment, etc.).  
When this product is used for the following special cases, the specification document suited to each application shall be signed/sealed (with Panasonic Industry and the user) in advance..These include applications requiring special quality and reliability, wherein their failures or malfunctions may directly threaten human life or cause harm to the human body (e.g.: space/aircraft equipment, transportation/traffic equipment, combustion equipment, medical equipment, disaster prevention/crime prevention equipment, safety equipment, etc.).

### Safety design and product evaluation

- Please ensure safety through protection circuits, redundant circuits, etc., in the customer's system design so that a defect in our company's product will not endanger human life or cause other serious damage.
- This catalog shows the quality and performance of individual parts. The durability of parts varies depending on the usage environment and conditions. Therefore, please ensure to evaluate and confirm the state of each part after it has been mounted in your product in the actual operating environment before use.  
If you have any doubts about the safety of this product, then please notify us immediately, and be sure to conduct a technical review including the above protection circuits and redundant circuits at your company.

### Laws / Regulations / Intellectual property

- The transportation of dangerous goods as designated by UN numbers, UN classifications, etc., does not apply to this product. In addition, when exporting products, product specifications, and technical information described in this catalog, please comply with the laws and regulations of the countries to which the products are exported, especially those concerning security export control.
- Each model of this product complies with the RoHS Directive (Restriction of the use of hazardous substances in electrical and electronic equipment) (2011/65/EU and (EU) 2015/863). The date of compliance with the RoHS Directive and REACH Regulation varies depending on the product model.  
Further, if you are using product models in stock and are not sure whether or not they comply with the RoHS Directive or REACH Regulation, please contact us by selecting "Sales Inquiry" from the inquiry form.
- During the manufacturing process of this product and any of its components and materials to be used, Panasonic Industry does not intentionally use ozone-depleting substances stipulated in the Montreal Protocol and specific bromine-based flame retardants such as PBBs (Poly-Brominated Biphenyls) / PBDEs (Poly-Brominated Diphenyl Ethers). In addition, the materials used in this product are all listed as existing chemical substances based on the Act on the Regulation of Manufacture and Evaluation of Chemical Substances.
- With regard to the disposal of this product, please confirm the disposal method in each country and region where it is incorporated into your company's product and used.
- The technical information contained in this catalog is intended to show only typical operation and application circuit examples of this product. This catalog does not guarantee that such information does not infringe upon the intellectual property rights of Panasonic Industry or any third party, nor imply that the license of such rights has been granted.
- Design, materials, or process related to technical owned by Panasonic Industry are subject to change without notice.

**Panasonic Industry will assume no liability whatsoever if the use of our company's products deviates from the contents of this catalog or does not comply with the precautions. Please be advised of these restrictions.**



## Matters to Be Observed When Using This Product

### (E / CK / SC-type)

#### Safety measures

An abnormal state of E-Type, CK-type, and SC-type varistors (ZNR surge absorber, hereinafter "the product" or "the surge absorber") that results from a problem with service conditions (materials used, the surrounding environment, power conditions, circuit conditions, etc.) may cause a fire accident, electric shock accident, burn accident, or product failure. Matters to note when handling this product will hereinafter be described. What is described below should be checked sufficiently before the product is used.

##### ■ Confirming rated capabilities

Use the surge absorber within the range of its rated capabilities. Each type of surge absorber has specified rated capabilities including a maximum allowable circuit voltage, a surge current tolerance, an energy tolerance, an impulse lifespan (surge lifespan), average pulse power, and a service temperature. Using the surge absorber under severe service conditions that are beyond the rated capabilities causes degraded performance of the surge absorber or destruction of a circuit element, which may lead to smoke generation, ignition, etc.

##### ■ Take the following measures in order to avoid an accident caused by expected phenomenon.

(1) Destruction of the surge absorber may scatter its fractured pieces around. To protect other elements from these pieces, set product in a case or shield it with a cover.

(2) Do not place the surge absorber near combustible materials (vinyl cable, resin mold, etc.). If avoiding the vicinity of combustible materials is difficult, protect the combustible material with an incombustible cover.

(3) Surge absorber placed between lines

When the surge absorber is placed between lines, connect a normal type current fuse in series with the surge absorber.

\* See "Current fuse" in the "Circuit design and circuit board design" section.

(4) Surge absorber placed between a line and the ground

① When the surge absorber is placed between a line and the ground, even if the surge absorber short-circuits, ground resistance will remain in the section between the line and the ground, leaving a possibility that the current fuse won't blow, in which case the outer sheath resin of the surge absorber may generate smoke or ignite due to current flow. To prevent such a case, place an earth leakage breaker in a location closer to the power supply than the surge absorber. When not using an earth leakage breaker, use a current fuse and temperature fuse in series with each other.

\* See Table 1 in the "Circuit design and circuit board design" section.

② When the surge absorber is placed between a live part and a metal case, it may cause electric shock if the surge absorber short-circuits. To avoid this, ground the metal case or shield it to prevent direct contact with the metal case.

##### ■ In case the surge absorber should short-circuit and generate smoke or ignite, immediately cut off current flow to the surge absorber.

##### ■ Rated voltage for UL certification, etc.

To allow the surge absorber to meet leak current requirements, etc., a maximum allowable circuit voltage and rated voltage are specified for the surge absorber.

When applying for UL certification, etc. of a device equipped with a surge absorber, ensure the working voltage of the device does not exceed the rated voltage of the surge absorber.

##### ■ An unexpected sharp rise in the working voltage, an incoming excessive surge, etc., may cause the surge absorber to generate smoke or ignite.

In such a case, fire spreading through the device should be prevented to avoid expanded damage. To achieve this, take a multi-protection measure, such as adopting fire-resistant materials that make up the outer shell components and structural materials.

#### Use environments and cleaning conditions

##### ■ Do not use the surge absorber in an outdoor environment where the surge absorber is exposed to sunlight.

##### ■ Do not use the surge absorber in which direct sunlight hits the surge absorber or near a heating element where the temperature of the surge absorber would rise above its working temperature.

##### ■ Do not use the surge absorber in a place where the surge absorber is exposed to wind or rain or a highly humid place where steam is emitted or dew concentrates.

##### ■ Do not use the surge absorber in a place filled with dust or salt, in an atmosphere contaminated with a corrosive gas, etc., or in liquids such as water, oil, chemical, or organic solvents.

- Do not wash the surge absorber with a solvent (thinner, acetone, etc.) that damages the outer sheath resin.

## Response to anomalies and handling conditions

Be careful not to drop the surge absorber on the floor, etc. The product is likely to suffer mechanical or electrical damage when dropped on the floor. Avoid using such a product.

## Reliability and product life

To know the detailed specifications of individual products or specific evaluation test scores, please contact us.

## Circuit design and circuit board design

Meet the following requirements. Not following the requirements can result in a shorter lifespan of the surge absorber or its failure.

- Choose a surge absorber whose maximum allowable circuit voltage has a margin relative to the maximum voltage range including source voltage fluctuations.

\* See Table 1 in the "Circuit design and circuit board design" section.

- When surges are applied intermittently to the surge absorber at short intervals (when pulses of voltages are applied in a noise simulator test, etc.), make sure that the surge power does not exceed the maximum average pulse power of the surge absorber.

- The product numbers of recommended surge absorbers to choose are shown in Table 1.

### (1) The case of placing the surge absorber between lines

When the source voltage is expected to rise temporarily due to unbalanced single-wire loads in a three-phase three-wire connection configuration, a short circuit between a voltage line and a neutral line, loss of the neutral line, or resonance of a capacitive load caused by switching on/off, use a surge absorber (varistor) indicated by "\*" in Table 1.

### (2) The case of placing the surge absorber between a line and the ground

Line-to-ground voltage may rise with a single-wire ground fault, etc. Use a recommended surge absorber in Table 1 that is different from the surge absorber placed between lines. When the device is subjected to an insulation resistance test (500 V DC), use a surge absorber indicated by "\*" in Table 1.

According to "Electrical Appliance Technical Standards" based on the Electrical Appliance and Material Safety Act, when using a varistor voltage which would fail the insulation performance test, the surge absorber may be removed from the device when being subjected to the test, depending on circuit test conditions.

\* See attached table 4, appendix 4, "Electrical Appliance Technical Standards" based on the Electrical Appliance and Material Safety Act.

When conducting a withstand voltage test (1000 V AC) of the device, remove the surge absorber from the device after getting approval from the parties concerned.

## ■ Current fuse

### (1) Select a surge absorber and fuses to use in as shown in the following table.

Confirm that no secondary accident arises when the surge absorber in an actual circuit breaks. Selected rated currents of current fuses shown in the following table are exemplary one and may vary depending on circuit conditions used. Confirm the rated current by a test, etc., before using the current fuse.

| Series                                                     | ERZC<br>20EK□□□(□) | ERZC<br>32EK□□□(□) | ERZV<br>S34C□□□  | ERZC<br>□□CK□□□W |
|------------------------------------------------------------|--------------------|--------------------|------------------|------------------|
| Current fuse<br>(placed between lines)                     | 10 A max.          | 20 A max.          | 20 A max.        | 20 A max.        |
| Temperature fuse<br>(placed between a line and the ground) | 100 to 120°C 5A    | 100 to 120°C 10A   | 100 to 120°C 10A | 100 to 120°C 10A |

\* Use the rated voltage of the current fuse that corresponds to the circuit voltage of a circuit including the current fuse.

\* Connect a temperature fuse directly to the terminal so that heat from the terminal is easily transferred to the fuse and that the fusing element of the fuse extends along its sides.

### (2) Recommended parts where fuses are connected are shown in Table 1. When a load current to a protected device is so large as to exceed the rated current of the fuse, however, connect the fuse in a location shown in the following diagram.

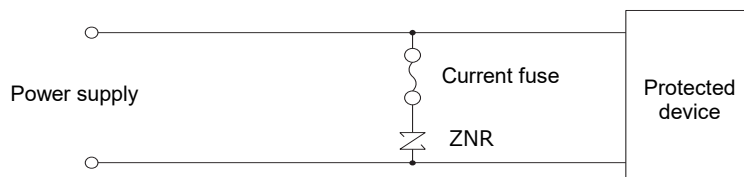
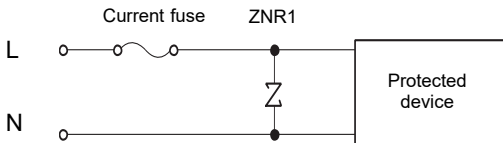
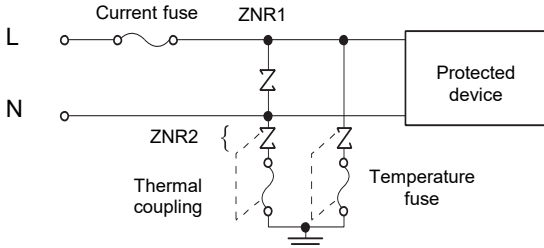
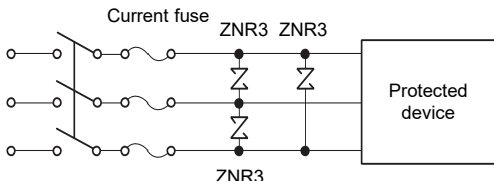
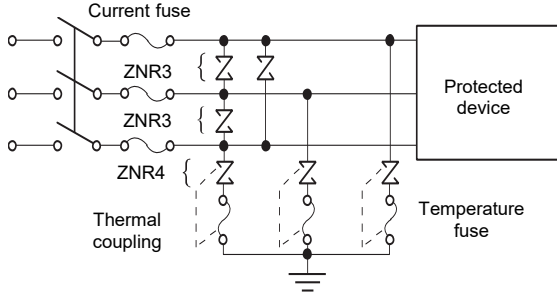




Table 1 Application example of the product (ordinary application example)

| Connection                                                                                               | Surge absorber placed between lines                                                                                                                                                                                                                                                                                                                                                                                |                                  | Surge absorber placed between a line and the ground                                                         |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|----------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------|-------------------------------------------------------------------------------------------------------------|---------------------------|-------------------------------|--|----------------|-------|----------------------------------|-------------|-------|-------------|----------------|-------------|-------|-----------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--|-----|---------------------------|-------------------------------|--|----------------|---------------|----------------------------------|-------------------------------|-------|
|                                                                                                          | DC<br>Single-phase AC<br>                                                                                                                                                                                                                                                                                                         |                                  | DC<br>Single-phase AC<br> |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
| Varistor voltage selection                                                                               | Three-phase AC<br>                                                                                                                                                                                                                                                                                                                |                                  | Three-phase AC<br>        |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|                                                                                                          | <table> <tr> <th>ZNR</th><th>Power supply voltage [AC]</th><th colspan="2">Part number<br/>E, CK, SC-type</th></tr> <tr> <td rowspan="4">ZNR 1<br/>ZNR 3</td><td>100 V</td><td rowspan="4">ERZC□□EK<br/>ERZC□□CK<br/>ERZVS34C</td><td>201 to 361*</td></tr> <tr> <td>120 V</td><td>241 to 431*</td></tr> <tr> <td>200 V to 220 V</td><td>471 to 621*</td></tr> <tr> <td>240 V</td><td>511, 621*</td></tr> </table> |                                  | ZNR                                                                                                         | Power supply voltage [AC] | Part number<br>E, CK, SC-type |  | ZNR 1<br>ZNR 3 | 100 V | ERZC□□EK<br>ERZC□□CK<br>ERZVS34C | 201 to 361* | 120 V | 241 to 431* | 200 V to 220 V | 471 to 621* | 240 V | 511, 621* | <table> <tr> <th>ZNR</th><th>Power supply voltage [AC]</th><th colspan="2">Part number<br/>E, CK, SC-type</th></tr> <tr> <td rowspan="2">ZNR 2<br/>ZNR 4</td><td>100V to 220 V</td><td rowspan="3">ERZC□□EK<br/>ERZC□□CK<br/>ERZVS34C</td><td>471<br/>511<br/>821 or higher**</td></tr> <tr> <td>240 V</td><td>511<br/>821 or higher**</td></tr> </table> |  | ZNR | Power supply voltage [AC] | Part number<br>E, CK, SC-type |  | ZNR 2<br>ZNR 4 | 100V to 220 V | ERZC□□EK<br>ERZC□□CK<br>ERZVS34C | 471<br>511<br>821 or higher** | 240 V |
| ZNR                                                                                                      | Power supply voltage [AC]                                                                                                                                                                                                                                                                                                                                                                                          | Part number<br>E, CK, SC-type    |                                                                                                             |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
| ZNR 1<br>ZNR 3                                                                                           | 100 V                                                                                                                                                                                                                                                                                                                                                                                                              | ERZC□□EK<br>ERZC□□CK<br>ERZVS34C | 201 to 361*                                                                                                 |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|                                                                                                          | 120 V                                                                                                                                                                                                                                                                                                                                                                                                              |                                  | 241 to 431*                                                                                                 |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|                                                                                                          | 200 V to 220 V                                                                                                                                                                                                                                                                                                                                                                                                     |                                  | 471 to 621*                                                                                                 |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|                                                                                                          | 240 V                                                                                                                                                                                                                                                                                                                                                                                                              |                                  | 511, 621*                                                                                                   |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
| ZNR                                                                                                      | Power supply voltage [AC]                                                                                                                                                                                                                                                                                                                                                                                          | Part number<br>E, CK, SC-type    |                                                                                                             |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
| ZNR 2<br>ZNR 4                                                                                           | 100V to 220 V                                                                                                                                                                                                                                                                                                                                                                                                      | ERZC□□EK<br>ERZC□□CK<br>ERZVS34C | 471<br>511<br>821 or higher**                                                                               |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
|                                                                                                          | 240 V                                                                                                                                                                                                                                                                                                                                                                                                              |                                  | 511<br>821 or higher**                                                                                      |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |
| * To find out about surge absorbers that can be used in an AC withstand voltage test, please contact us. |                                                                                                                                                                                                                                                                                                                                                                                                                    |                                  |                                                                                                             |                           |                               |  |                |       |                                  |             |       |             |                |             |       |           |                                                                                                                                                                                                                                                                                                                                                           |  |     |                           |                               |  |                |               |                                  |                               |       |

Processing conditions

- Do not apply vibration, impact (drop impact, etc.), or pressure strong enough to crack the outer sheath resin or absorber body of the surge absorber.
- When coating the surge absorber with a resin or embedding it in a resin mold, avoid using a resin that degrades the surge absorber.
- Do not bend the surge absorber or apply force thereto close to the insulation cover of the lead terminal.
- Make the wire as short and straight as possible.

Mounting and storage conditions

- Do not melt solder or the insulation material making up the surge absorber when soldering the lead terminal.
- Do not keep the product in a high-temperature or high-humidity condition. Keep the surge absorber in a room with a temperature of 40 °C or lower and a relative humidity of 75% or lower and use the surge absorber within two years of storage.
- Keep the surge absorber in a place where no corrosive gas atmosphere (hydrogen sulfide, sulfurous acid, chlorine, ammonia, etc.) is present.
- Keep the surge absorber in a place where the surge absorber is protected from direct sunlight, dew concentration, etc.