



# THE DATASHEET OF ERZ-CF2MK390



## “ZNR” Transient/Surge Absorbers, SMD MoLd

Type: **VF**  
 Type: **CF**  
 Type: **SF**



### Features

- Large withstanding surge current capability in compact size
- Designed for flow/reflow solderings
- Excellent response against high steep surge voltage
- Low clamping voltage for better surge protection

### Recommended Applications

- Protection of communication module (Modem, xDSL, Terminal Adopter)
- Protection of consumer equipment
- Protection of industrial equipment
- Protection of automobile equipment
- Absorption of switching surge from relays

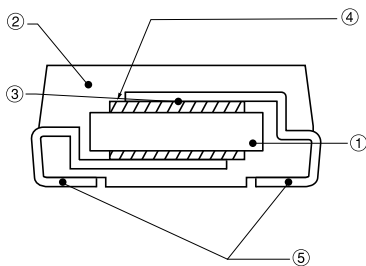
### Precautions for Handling

See Page 134 to 136

### Explanation of Part Numbers

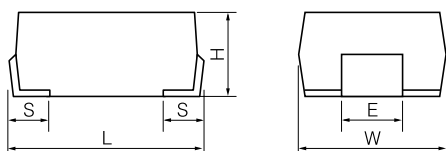


### Construction



|                       |                               |
|-----------------------|-------------------------------|
| ① ZNR element         | ZnO etc.                      |
| ② Resin mold          | Epoxy Resin(UL94V-0 approved) |
| ③ Conductive adhesive | Silver                        |
| ④ Electrode           | Silver                        |
| ⑤ Lead terminals      | Soldered Ni-Fe Alloy          |

### Dimensions in mm (not to scale)



| Type | W       | L       | H       | S       | E       |
|------|---------|---------|---------|---------|---------|
| VF□M | 6.0±0.4 | 8.0±0.5 | 3.2±0.3 | 1.3±0.3 | 2.5±0.2 |
| VF□T | 6.0±0.4 | 8.0±0.5 | 2.3±0.1 | 1.3±0.3 | 2.5±0.2 |
| CF   | 6.0±0.4 | 8.0±0.5 | 3.2±0.3 | 1.3±0.3 | 2.5±0.2 |
| SF   | 6.2±0.4 |         |         |         |         |

### ■ Ratings and Characteristics

- Operating Temperature Range: -40 to 85 °C
- Storage Temperature Range: -40 to 125 °C
- Temperature Coefficient of Varistor Voltage: 0 to -0.05 %/°C

| Part No.  | Varistor Voltage     | Maximum Allowable Voltage |        | Clamping Voltage at I <sub>p</sub> (max.) |                    | Rated Power (W) | Maximum Energy (2 ms) (W) | Maximum Peak Current (8/20 μs, 2 times) (A) |     |
|-----------|----------------------|---------------------------|--------|---|--------------------|-----------------|---------------------------|---|-----|
|           | V <sub>1mA</sub> (V) | ACrms (V)                 | DC (V) | V <sub>xA</sub> (V)                       | I <sub>p</sub> (A) |                 |                           |   |     |
| Type VF□M | *ERZVF□M220          | 22( 20~ 24)               | 14     | 18  | 43                 | 2.5             | 0.01                      | 0.5   | 125 |
|           | *ERZVF□M270          | 27( 24~ 30)               | 17     | 22  | 53                 | 2.5             | 0.01                      | 0.7   | 125 |
|           | *ERZVF□M330          | 33( 30~ 36)               | 20     | 26  | 65                 | 2.5             | 0.01                      | 0.8   | 125 |
|           | *ERZVF□M390          | 39( 35~ 43)               | 25     | 31  | 77                 | 2.5             | 0.01                      | 0.9   | 125 |
|           | *ERZVF□M470          | 47( 42~ 52)               | 30     | 38  | 93                 | 2.5             | 0.01                      | 1.1   | 125 |
|           | *ERZVF□M560          | 56( 50~ 62)               | 35     | 45  | 110                | 2.5             | 0.01                      | 1.3   | 125 |
|           | *ERZVF□M680          | 68( 61~ 75)               | 40     | 56  | 135                | 2.5             | 0.01                      | 1.6   | 125 |
|           | ERZVF□M820           | 82( 74~ 90)               | 50     | 65  | 135                | 10              | 0.1                       | 2.5   | 600 |
|           | ERZVF□M101           | 100( 90~110)              | 60     | 85  | 165                | 10              | 0.1                       | 3.0   | 600 |
|           | ERZVF□M121           | 120(108~132)              | 75     | 100                                       | 200                | 10              | 0.1                       | 3.5   | 600 |
|           | ERZVF□M151           | 150(135~165)              | 95     | 125                                       | 250                | 10              | 0.1                       | 4.5   | 600 |
|           | ERZVF□M201           | 200(185~225)              | 130    | 170                                       | 340                | 10              | 0.1                       | 6.0   | 600 |
|           | ERZVF□M221           | 220(198~242)              | 140    | 180                                       | 360                | 10              | 0.1                       | 6.5   | 600 |
|           | ERZVF□M241           | 240(216~264)              | 150    | 200                                       | 395                | 10              | 0.1                       | 7.5   | 600 |
|           | ERZVF□M271           | 270(247~303)              | 175    | 225                                       | 455                | 10              | 0.1                       | 8.0   | 600 |
|           | *ERZVF□M331          | 330(297~363)              | 210    | 270                                       | 545                | 10              | 0.1                       | 8.0   | 300 |
|           | *ERZVF□M361          | 360(324~396)              | 230    | 300                                       | 595                | 10              | 0.1                       | 9.0   | 300 |
|           | *ERZVF□M391          | 390(351~429)              | 250    | 320                                       | 650                | 10              | 0.1                       | 9.0   | 300 |
|           | *ERZVF□M431          | 430(387~473)              | 275    | 350                                       | 710                | 10              | 0.1                       | 10.0  | 300 |
|           | *ERZVF□M471          | 470(423~517)              | 300    | 385                                       | 775                | 10              | 0.1                       | 10.0  | 300 |

└ Packaging Style Code: "1" for bulk, "2" for embossed taping

| Part No.  | Varistor Voltage     | Maximum Allowable Voltage |        | Clamping Voltage at I <sub>p</sub> (max.) |                    | Rated Power (W) | Maximum Energy (2 ms) (W) | Maximum Peak Current (8/20 μs, 2 times) (A) |     |
|-----------|----------------------|---------------------------|--------|---|--------------------|-----------------|---------------------------|---|-----|
|           | V <sub>1mA</sub> (V) | ACrms (V)                 | DC (V) | V <sub>xA</sub> (V)                       | I <sub>p</sub> (A) |                 |                           |   |     |
| Type VF□T | ERZVF□T820           | 82( 74~ 90)               | 50     | 65  | 145                | 5               | 0.1                       | 1.7   | 400 |
|           | ERZVF□T101           | 100( 90~110)              | 60     | 85  | 175                | 5               | 0.1                       | 2.0   | 400 |
|           | ERZVF□T151           | 150(135~165)              | 95     | 125                                       | 260                | 5               | 0.1                       | 3.0   | 400 |
|           | ERZVF□T241           | 240(216~264)              | 150    | 200                                       | 415                | 5               | 0.1                       | 5.0   | 400 |
|           | ERZVF□T271           | 270(247~303)              | 175    | 225                                       | 475                | 5               | 0.1                       | 6.0   | 400 |

└ Packaging Style Code: "1" for bulk, "2" for embossed taping

### ■ Ratings and Characteristics

- Operating Temperature Range: -40 to 85 °C
- Storage Temperature Range: -40 to 125 °C
- Temperature Coefficient of Varistor Voltage: 0 to -0.05 %/°C

| Part No.    | Varistor Voltage       | Maximum Allowable Voltage |        | Clamping Voltage at I <sub>p</sub> (max.) |                    | Rated Power (W) | Maximum Energy (2 ms) (J) | Maximum Peak Current (8/20 μs, 2 times) (A) |     |
|-------------|------------------------|---------------------------|--------|---|--------------------|-----------------|---------------------------|---|-----|
|             | V <sub>0.1mA</sub> (V) | ACrms (V)                 | DC (V) | V <sub>xA</sub> (V)                       | I <sub>p</sub> (A) |                 |                           |   |     |
| Type CF     | ERZCF□MK220            | 22 ( 20– 24)              | 14     | 18  | 48                 | 1               | 0.01                      | 0.4   | 50  |
|             | ERZCF□MK270            | 27 ( 24– 30)              | 17     | 22  | 60                 | 1               | 0.01                      | 0.5   | 50  |
|             | ERZCF□MK330            | 33 ( 30– 36)              | 20     | 26  | 73                 | 1               | 0.01                      | 0.6   | 50  |
|             | ERZCF□MK390            | 39 ( 35– 43)              | 25     | 31  | 86                 | 1               | 0.01                      | 0.8   | 50  |
|             | ERZCF□MK470            | 47 ( 42– 52)              | 30     | 38  | 104                | 1               | 0.01                      | 1.0   | 50  |
|             | ERZCF□MK560            | 56 ( 50– 62)              | 35     | 45  | 123                | 1               | 0.01                      | 1.0   | 50  |
|             | ERZCF□MK680            | 68 ( 61– 75)              | 40     | 56  | 150                | 1               | 0.01                      | 1.2   | 50  |
|             | ERZCF□MK820            | 82 ( 74– 90)              | 50     | 65  | 145                | 5               | 0.1                       | 1.7   | 200 |
|             | ERZCF□MK101            | 100 ( 90–110)             | 60     | 85  | 175                | 5               | 0.1                       | 2.0   | 200 |
|             | ERZCF□MK121            | 120 (108–132)             | 75     | 100                                       | 210                | 5               | 0.1                       | 2.5   | 200 |
|             | ERZCF□MK151            | 150 (135–165)             | 95     | 125                                       | 260                | 5               | 0.1                       | 3.0   | 200 |
|             | ERZCF□MK201            | 200 (185–225)             | 130    | 170                                       | 355                | 5               | 0.1                       | 4.0   | 200 |
|             | ERZCF□MK221            | 220 (198–242)             | 140    | 180                                       | 380                | 5               | 0.1                       | 4.5   | 200 |
|             | ERZCF□MK241            | 240 (216–264)             | 150    | 200                                       | 415                | 5               | 0.1                       | 5.0   | 200 |
|             | ERZCF□MK271            | 270 (247–303)             | 175    | 225                                       | 475                | 5               | 0.1                       | 6.0   | 200 |
|             | ERZCF□MK361            | 360 (324–396)             | 230    | 300                                       | 620                | 5               | 0.1                       | 6.0   | 200 |
|             | ERZCF□MK391            | 390 (351–429)             | 250    | 320                                       | 675                | 5               | 0.1                       | 6.0   | 200 |
|             | ERZCF□MK431            | 430 (387–473)             | 275    | 350                                       | 745                | 5               | 0.1                       | 6.3   | 200 |
| ERZCF□MK471 | 470 (423–517)          | 300                       | 385    | 810                                       | 5                  | 0.1             | 7.0                       | 200   |     |

↑ Packaging Style Code: “1” for bulk, “2” for embossed taping

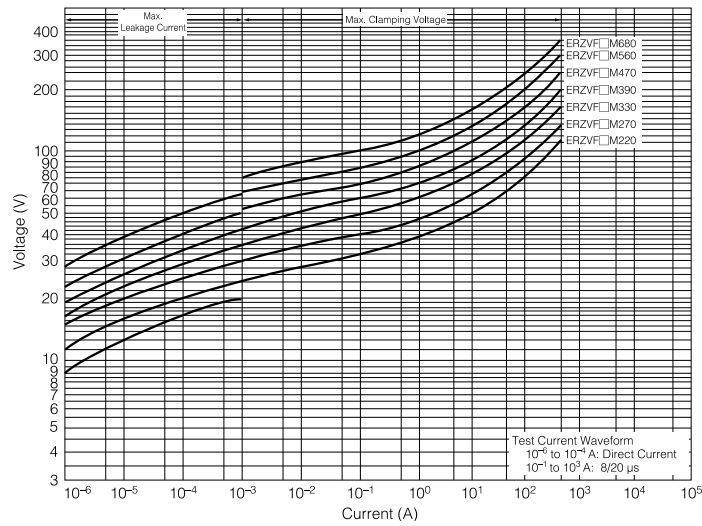
| Part No.    | Varistor Voltage     | Maximum Allowable Voltage |        | Clamping Voltage at I <sub>p</sub> (max.) |                    | Rated Power (W) | Maximum Energy (2 ms) (J) | Maximum Peak Current (8/20 μs, 2 times) (A) |     |
|-------------|----------------------|---------------------------|--------|---|--------------------|-----------------|---------------------------|---|-----|
|             | V <sub>1mA</sub> (V) | ACrms (V)                 | DC (V) | V <sub>xA</sub> (V)                       | I <sub>p</sub> (A) |                 |                           |   |     |
| Type SF     | ERZSF□MK220          | 22 ( 20– 25)              | 14     | 18  | 43                 | 2.5             | 0.02                      | 0.9   | 125 |
|             | ERZSF□MK270          | 27 ( 24– 30)              | 17     | 22  | 53                 | 2.5             | 0.02                      | 1.0   | 125 |
|             | ERZSF□MK330          | 33 ( 30– 36)              | 20     | 26  | 65                 | 2.5             | 0.02                      | 1.2   | 125 |
|             | ERZSF□MK390          | 39 ( 35– 43)              | 25     | 31  | 77                 | 2.5             | 0.02                      | 1.5   | 125 |
|             | ERZSF□MK470          | 47 ( 42– 52)              | 30     | 38  | 93                 | 2.5             | 0.02                      | 1.8   | 125 |
|             | ERZSF□MK560          | 56 ( 50– 62)              | 35     | 45  | 110                | 2.5             | 0.02                      | 2.2   | 125 |
|             | ERZSF□MK680          | 68 ( 61– 75)              | 40     | 56  | 135                | 2.5             | 0.02                      | 2.5   | 125 |
|             | ERZSF□MK820          | 82 ( 74– 90)              | 50     | 65  | 135                | 10              | 0.25                      | 3.5   | 600 |
|             | ERZSF□MK101          | 100 ( 90–110)             | 60     | 85  | 165                | 10              | 0.25                      | 4.0   | 600 |
|             | ERZSF□MK121          | 120 (108–132)             | 75     | 100                                       | 200                | 10              | 0.25                      | 5.0   | 600 |
|             | ERZSF□MK151          | 150 (135–165)             | 95     | 125                                       | 250                | 10              | 0.25                      | 6.0   | 600 |
|             | ERZSF□MK201          | 200 (185–225)             | 130    | 170                                       | 340                | 10              | 0.25                      | 8.0   | 600 |
|             | ERZSF□MK221          | 220 (198–242)             | 140    | 180                                       | 360                | 10              | 0.25                      | 9.0   | 600 |
|             | ERZSF□MK241          | 240 (216–264)             | 150    | 200                                       | 395                | 10              | 0.25                      | 10.0  | 600 |
|             | ERZSF□MK271          | 270 (247–303)             | 175    | 225                                       | 455                | 10              | 0.25                      | 12.0  | 600 |
|             | ERZSF□MK361          | 360 (324–396)             | 230    | 300                                       | 595                | 10              | 0.20                      | 12.0  | 400 |
|             | ERZSF□MK391          | 390 (351–429)             | 250    | 320                                       | 650                | 10              | 0.20                      | 12.0  | 400 |
|             | ERZSF□MK431          | 430 (387–473)             | 275    | 350                                       | 710                | 10              | 0.20                      | 14.0  | 400 |
| ERZSF□MK471 | 470 (423–517)        | 300                       | 385    | 775                                       | 10                 | 0.20            | 14.0                      | 400   |     |

↑ Packaging Style Code: “1” for bulk, “2” for embossed taping

### ■ Typical Characteristics

#### ■ Voltage vs. Current

#### ■ ERZVF1(2)M220 to ERZVF1(2)M680



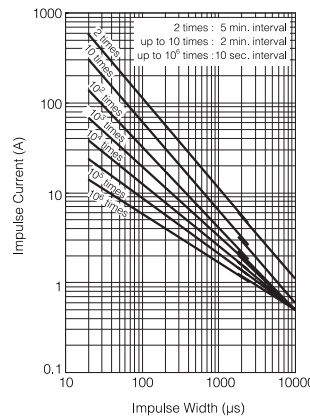
#### ■ Impulse



#### ■ ERZVF1(2)M820 to ERZVF1(2)M471



#### ERZVF1(2)M820 to ERZVF1(2)M271



#### ERZVF1(2)M331 to ERZVF1(2)M471



#### ■ ERZVF1(2)T820 to ERZVF1(2)T271



## ■ Typical Characteristics

### ■ Voltage vs. Current

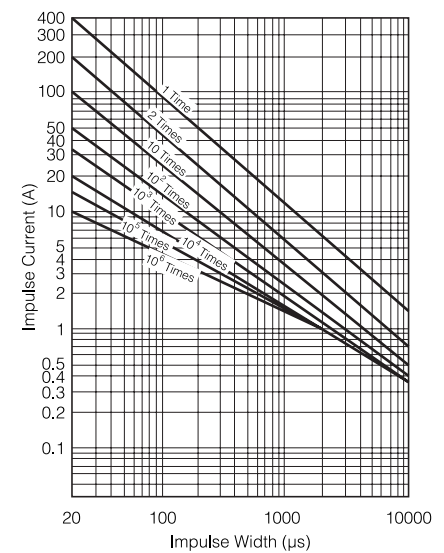
#### ■ ERZCF1 (2) MK220 to ERZCF1 (2) MK680



### ■ Impulse



#### ■ ERZCF1 (2) MK820 to ERZCF1 (2) MK471



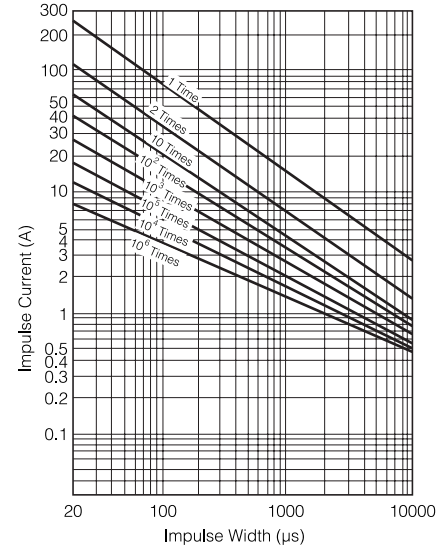
## ■ Typical Characteristics

### ■ Voltage vs. Current

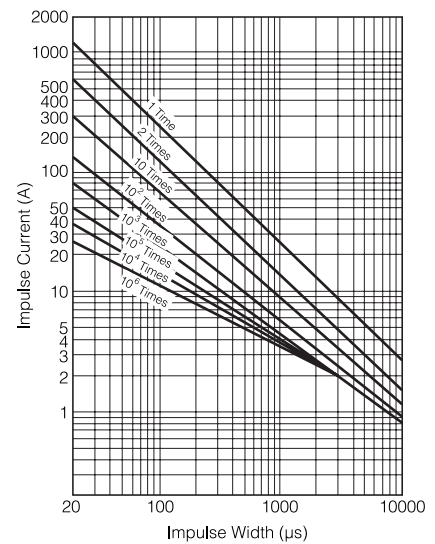
#### ■ ERZSF1 (2) MK220 to ERZSF1 (2) MK680



### ■ Impulse



#### ■ ERZSF1 (2) MK820 to ERZSF1 (2) MK471



### ■ Marking Contents



|                            |   |
|----------------------------|---|
| ① Trade Mark               | Trade Mark  |
| ② Product Name             | ZNR   |
| ③ Type                     | VF□M Type:VFM, VF□T Type:VFT<br>CF Type:FK, SF Type:SF  |
| ④ Abbreviation of Part No. | The first two digits are significant figures and the third one denotes the number of zeros following.           |
| ⑤ Date Code                | Left(Year): 2002:B, 2003:C, 2004:D, 2005:E, 2006:F<br>Right(Month): Jan. to Sep.:1 to 9, Oct.:0, Nov.:N, Dec.:D |

### ■ Packaging Specifications

#### ● Packing Quantity

| Size Code                  | Style | Embossed taping | Bulk         |
|----------------------------|-------|-----------------|--------------|
| “VF□M”, “VF□T”, “CF”, “SF” |       | 2000 pcs./reel  | 200 pcs./bag |

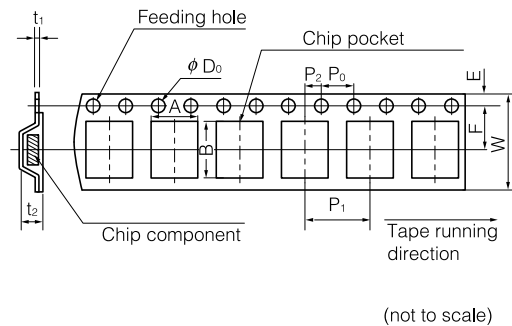
#### ● Reel



|                 |                                   |           |          |          |         |
|-----------------|-----------------------------------|-----------|----------|----------|---------|
| Dimensions (mm) | A                                 | B         | C        | D        | E       |
|                 | 382 max.                          | 50 min.   | 13.0±0.5 | 21.0±0.8 | 2.0±0.5 |
| Dimensions (mm) | W                                 | T         | t        | r        |         |
|                 | 16.4 <sup>+2.0</sup> <sub>0</sub> | 22.4 max. | 2.5±0.5  | 1.0      |         |

#### ● Embossed Taping

(W=16 mm)



|                 |                |                |                                  |                |                |                |
|-----------------|----------------|----------------|----------------------------------|----------------|----------------|----------------|
| Dimensions (mm) | A              | B              | W                                | F              | E              | P <sub>1</sub> |
|                 | 6.8±0.2        | 11.9 max.      | 16.0±0.3                         | 7.5±0.1        | 1.75±0.10      | 8.0±0.1        |
| Dimensions (mm) | P <sub>2</sub> | P <sub>0</sub> | φD <sub>0</sub>                  | t <sub>1</sub> | t <sub>2</sub> |                |
|                 | 2.0±0.1        | 4.0±0.1        | 1.5 <sup>+0.1</sup> <sub>0</sub> | 0.6 max.       | 6.5 max.       |                |



■ Performance Characteristics

| Characteristics                             | Test Methods   | Specifications                   |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|---|--|----------------------------------|--------------|----------|---------|------|--------------------------|--------------|-----|--------------------------|--------------|------|--------------------------|--------------|------|------|--------------------------|--------------|------|----|----------------------------|------|--------|--|----------------------------|--------------|------|----|----------------------------|--------------|------|----------------------------|--------------|------|----------------------------|--------------|------|--|
| Standard Test Condition                     | Electrical measurements (initial/after tests) shall be conducted at temperature of 5 to 35 °C, relative humidity of maximum 85 %   | —                                |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Varistor Voltage                            | The voltage between two terminals with the specified measuring current $C_{mA}$ DC applied is called $V_c$ or $V_{CmA}$ . The measurement shall be made as fast as possible to avoid heat affection.   | To meet the specified value.     |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Maximum Allowable Voltage                   | The recommended 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 impulse current (8/20 $\mu$ s).   |                                  |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Rated Power                                 | The maximum power that can be applied within the specified ambient temperature.  |                                  |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Maximum Energy                              | Maximum energy at less than $\pm 10$ % of varistor voltage change when the standard impulse (2 ms) is applied one time.  |                                  |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Maximum Peak Current                        | Maximum current at less than $\pm 10$ % of varistor voltage change when impulse current (8/20 $\mu$ s) is applied two times continuously with the interval of 5 minutes.   |                                  |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Temperature Coefficient of Varistor Voltage | $\frac{V_{CmA} \text{ at } 85\text{ }^\circ\text{C} - V_{CmA} \text{ at } 25\text{ }^\circ\text{C}}{V_{CmA} \text{ at } 25\text{ }^\circ\text{C}} \times \frac{1}{60} \times 100(\%/^\circ\text{C})$   | 0 to $-0.05$ %/ $^\circ\text{C}$ |              |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Impulse Life (I)                            | <p>The change of <math>V_c</math> shall be measured after the specified impulse is applied 10000 times continuously with the interval of 10 seconds at room temperature.</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Part Number</th> <th>Waveform</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td rowspan="3">VF□M</td> <td>ERZVF□M220 to ERZVF□M680</td> <td>8/20 <math>\mu</math>s</td> <td>8 A</td> </tr> <tr> <td>ERZVF□M820 to ERZVF□M271</td> <td>8/20 <math>\mu</math>s</td> <td>40 A</td> </tr> <tr> <td>ERZVF□M331 to ERZVF□M471</td> <td>8/20 <math>\mu</math>s</td> <td>30 A</td> </tr> <tr> <td rowspan="2">VF□T</td> <td>ERZVF□T820 to ERZVF□T271</td> <td>8/20 <math>\mu</math>s</td> <td>20 A</td> </tr> <tr> <td rowspan="2">CF</td> <td>ERZCF□MK220 to ERZCF□MK680</td> <td>2 ms</td> <td>0.5 A</td> </tr> <tr> <td></td> <td>ERZCF□MK820 to ERZCF□MK471</td> <td>8/20 <math>\mu</math>s</td> <td>20 A</td> </tr> <tr> <td rowspan="3">SF</td> <td>ERZSF□MK220 to ERZSF□MK680</td> <td>8/20 <math>\mu</math>s</td> <td>18 A</td> </tr> <tr> <td>ERZSF□MK820 to ERZSF□MK271</td> <td>8/20 <math>\mu</math>s</td> <td>50 A</td> </tr> <tr> <td>ERZSF□MK331 to ERZSF□MK471</td> <td>8/20 <math>\mu</math>s</td> <td>40 A</td> </tr> </tbody> </table>   | Type                             | Part Number  | Waveform | Current | VF□M | ERZVF□M220 to ERZVF□M680 | 8/20 $\mu$ s | 8 A | ERZVF□M820 to ERZVF□M271 | 8/20 $\mu$ s | 40 A | ERZVF□M331 to ERZVF□M471 | 8/20 $\mu$ s | 30 A | VF□T | ERZVF□T820 to ERZVF□T271 | 8/20 $\mu$ s | 20 A | CF | ERZCF□MK220 to ERZCF□MK680 | 2 ms | 0.5 A  |  | ERZCF□MK820 to ERZCF□MK471 | 8/20 $\mu$ s | 20 A | SF | ERZSF□MK220 to ERZSF□MK680 | 8/20 $\mu$ s | 18 A | ERZSF□MK820 to ERZSF□MK271 | 8/20 $\mu$ s | 50 A | ERZSF□MK331 to ERZSF□MK471 | 8/20 $\mu$ s | 40 A | $\Delta V_{CmA}/V_{CmA} \leq \pm 10$ % |
| Type  | Part Number  | Waveform                         | Current      |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| VF□M  | ERZVF□M220 to ERZVF□M680   | 8/20 $\mu$ s                     | 8 A          |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZVF□M820 to ERZVF□M271   | 8/20 $\mu$ s                     | 40 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZVF□M331 to ERZVF□M471   | 8/20 $\mu$ s                     | 30 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| VF□T  | ERZVF□T820 to ERZVF□T271   | 8/20 $\mu$ s                     | 20 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | CF   | ERZCF□MK220 to ERZCF□MK680       | 2 ms         | 0.5 A    |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   |  | ERZCF□MK820 to ERZCF□MK471       | 8/20 $\mu$ s | 20 A     |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| SF  | ERZSF□MK220 to ERZSF□MK680   | 8/20 $\mu$ s                     | 18 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZSF□MK820 to ERZSF□MK271   | 8/20 $\mu$ s                     | 50 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZSF□MK331 to ERZSF□MK471   | 8/20 $\mu$ s                     | 40 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| Impulse Life (II)                           | <p>The change of <math>V_c</math> shall be measured after the specified impulse is applied 100000 times continuously with the interval of 10 seconds at room temperature.</p> <table border="1"> <thead> <tr> <th>Type</th> <th>Part Number</th> <th>Waveform</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td rowspan="3">VF□M</td> <td>ERZVF□M220 to ERZVF□M680</td> <td>8/20 <math>\mu</math>s</td> <td>5 A</td> </tr> <tr> <td>ERZVF□M820 to ERZVF□M271</td> <td>8/20 <math>\mu</math>s</td> <td>25 A</td> </tr> <tr> <td>ERZVF□M331 to ERZVF□M471</td> <td>8/20 <math>\mu</math>s</td> <td>20 A</td> </tr> <tr> <td rowspan="2">VF□T</td> <td>ERZVF□T820 to ERZVF□T271</td> <td>8/20 <math>\mu</math>s</td> <td>14 A</td> </tr> <tr> <td rowspan="2">CF</td> <td>ERZCF□MK220 to ERZCF□MK680</td> <td>2 ms</td> <td>0.45 A</td> </tr> <tr> <td></td> <td>ERZCF□MK820 to ERZCF□MK471</td> <td>8/20 <math>\mu</math>s</td> <td>14 A</td> </tr> <tr> <td rowspan="3">SF</td> <td>ERZSF□MK220 to ERZSF□MK680</td> <td>8/20 <math>\mu</math>s</td> <td>12 A</td> </tr> <tr> <td>ERZSF□MK820 to ERZSF□MK271</td> <td>8/20 <math>\mu</math>s</td> <td>35 A</td> </tr> <tr> <td>ERZSF□MK331 to ERZSF□MK471</td> <td>8/20 <math>\mu</math>s</td> <td>28 A</td> </tr> </tbody> </table> | Type                             | Part Number  | Waveform | Current | VF□M | ERZVF□M220 to ERZVF□M680 | 8/20 $\mu$ s | 5 A | ERZVF□M820 to ERZVF□M271 | 8/20 $\mu$ s | 25 A | ERZVF□M331 to ERZVF□M471 | 8/20 $\mu$ s | 20 A | VF□T | ERZVF□T820 to ERZVF□T271 | 8/20 $\mu$ s | 14 A | CF | ERZCF□MK220 to ERZCF□MK680 | 2 ms | 0.45 A |  | ERZCF□MK820 to ERZCF□MK471 | 8/20 $\mu$ s | 14 A | SF | ERZSF□MK220 to ERZSF□MK680 | 8/20 $\mu$ s | 12 A | ERZSF□MK820 to ERZSF□MK271 | 8/20 $\mu$ s | 35 A | ERZSF□MK331 to ERZSF□MK471 | 8/20 $\mu$ s | 28 A | $\Delta V_{CmA}/V_{CmA} \leq \pm 10$ % |
| Type  | Part Number  | Waveform                         | Current      |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| VF□M  | ERZVF□M220 to ERZVF□M680   | 8/20 $\mu$ s                     | 5 A          |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZVF□M820 to ERZVF□M271   | 8/20 $\mu$ s                     | 25 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZVF□M331 to ERZVF□M471   | 8/20 $\mu$ s                     | 20 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| VF□T  | ERZVF□T820 to ERZVF□T271   | 8/20 $\mu$ s                     | 14 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | CF   | ERZCF□MK220 to ERZCF□MK680       | 2 ms         | 0.45 A   |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   |  | ERZCF□MK820 to ERZCF□MK471       | 8/20 $\mu$ s | 14 A     |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
| SF  | ERZSF□MK220 to ERZSF□MK680   | 8/20 $\mu$ s                     | 12 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZSF□MK820 to ERZSF□MK271   | 8/20 $\mu$ s                     | 35 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |
|   | ERZSF□MK331 to ERZSF□MK471   | 8/20 $\mu$ s                     | 28 A         |          |         |      |                          |              |     |                          |              |      |                          |              |      |      |                          |              |      |    |                            |      |        |  |                            |              |      |    |                            |              |      |                            |              |      |                            |              |      |  |

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