

"ZNR" Transient/Surge Absorbers, SMD Type

Series: **VF**



■ Features

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

■ Recommended Applications

- Protection of communication modules (Modem, xDSL, Terminal Adaptor)
- Protection of consumer, industrial and automobile equipment
- Absorption of switching surge from relays

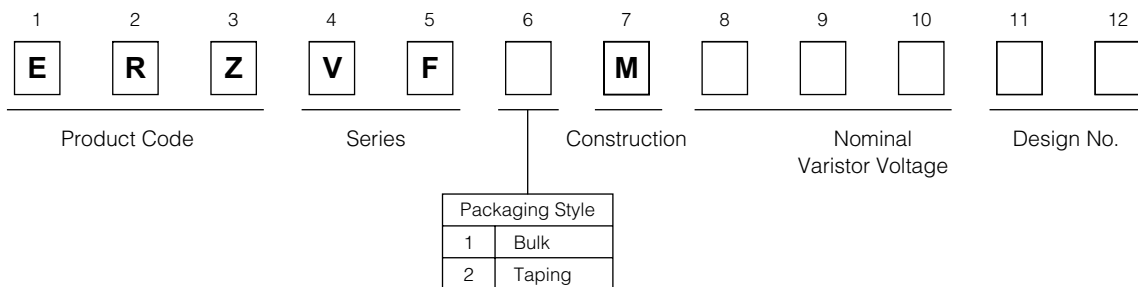
■ Handling Precautions

See Page 114 to 116

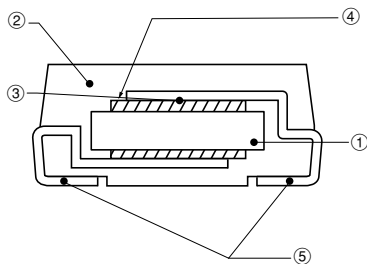
■ Packaging Specifications

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■ Explanation of Part Numbers

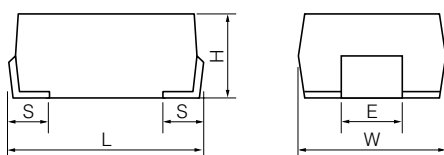


■ Construction



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

■ Ratings and Characteristics

- Operating Temperature Range: -40 to 85 °C
- Storage Temperature Range: -40 to 125 °C

| Part No. | Varistor Voltage | Maximum Allowable Voltage | | Clamping Voltage at I _p (max.) | | Rated Power (W) | Maximum Energy (2 ms) (J) | Maximum Peak Current (8/20 μs, 2 times) (A) |
|------------|-----------------------|---------------------------|--------|---|--------------------|-----------------|---------------------------|---|
| | V _{1 mA} (V) | ACrms (V) | DC (V) | V _{CA} (V) | I _p (A) | | | |
| ERZVF□M220 | 22(20-24) | 14 | 18 | 43 | 2.5 | 0.02 | 0.9 | 125 |
| ERZVF□M270 | 27(24-30) | 17 | 22 | 53 | 2.5 | 0.02 | 1.0 | 125 |
| ERZVF□M330 | 33(30-36) | 20 | 26 | 65 | 2.5 | 0.02 | 1.2 | 125 |
| ERZVF□M390 | 39(35-43) | 25 | 31 | 77 | 2.5 | 0.02 | 1.5 | 125 |
| ERZVF□M470 | 47(42-52) | 30 | 38 | 93 | 2.5 | 0.02 | 1.8 | 125 |
| ERZVF□M560 | 56(50-62) | 35 | 45 | 110 | 2.5 | 0.02 | 2.2 | 125 |
| ERZVF□M680 | 68(61-75) | 40 | 56 | 135 | 2.5 | 0.02 | 2.5 | 125 |
| ERZVF□M820 | 82(74-90) | 50 | 65 | 135 | 10 | 0.25 | 3.5 | 600 |
| ERZVF□M101 | 100(90-110) | 60 | 85 | 165 | 10 | 0.25 | 4.0 | 600 |
| ERZVF□M121 | 120(108-132) | 75 | 100 | 200 | 10 | 0.25 | 5.0 | 600 |
| ERZVF□M151 | 150(135-165) | 95 | 125 | 250 | 10 | 0.25 | 6.0 | 600 |
| ERZVF□M201 | 200(185-225) | 130 | 170 | 340 | 10 | 0.25 | 8.0 | 600 |
| ERZVF□M221 | 220(198-242) | 140 | 180 | 360 | 10 | 0.25 | 9.0 | 600 |
| ERZVF□M241 | 240(216-264) | 150 | 200 | 395 | 10 | 0.25 | 10.0 | 600 |
| ERZVF□M271 | 270(247-303) | 175 | 225 | 455 | 10 | 0.25 | 12.0 | 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 |

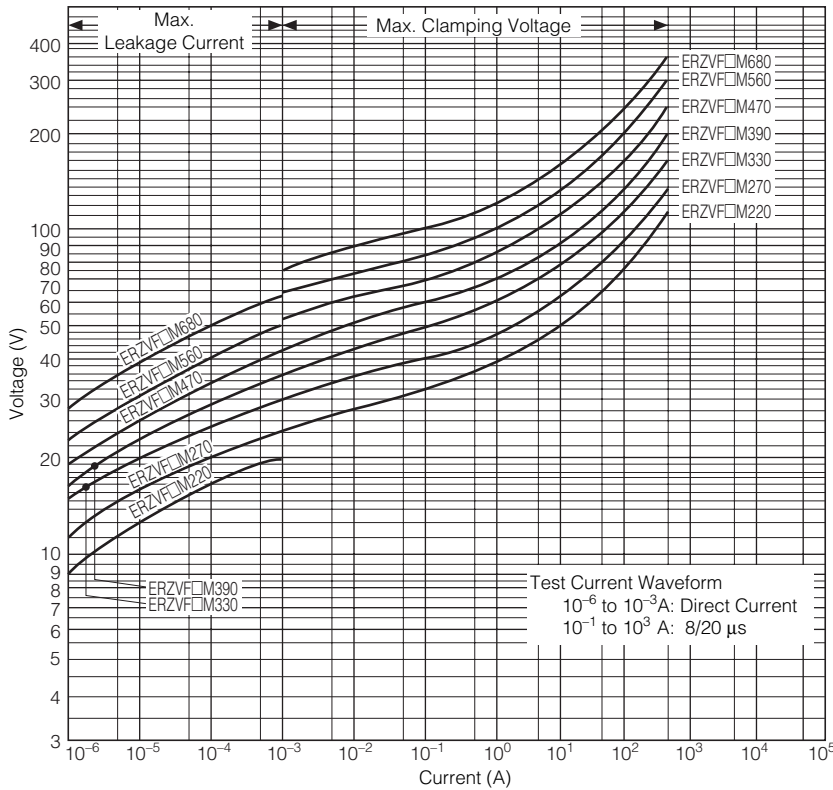
Type VF□M

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

■ Typical Characteristics

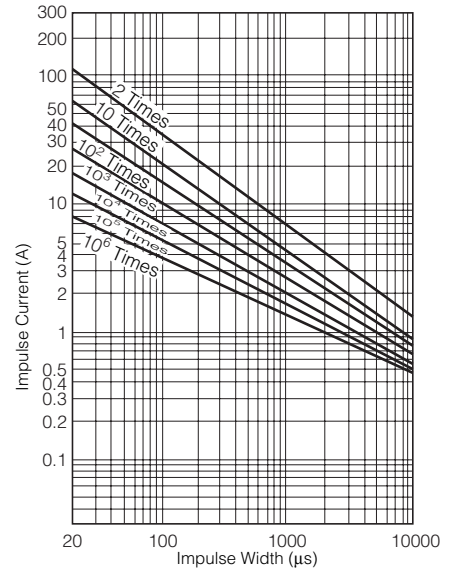
■ Voltage vs. Current

■ ERZVF1(2)M220 to ERZVF1(2)M680

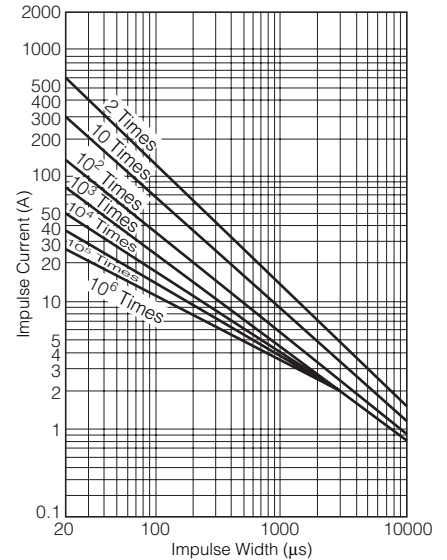


■ Impulse

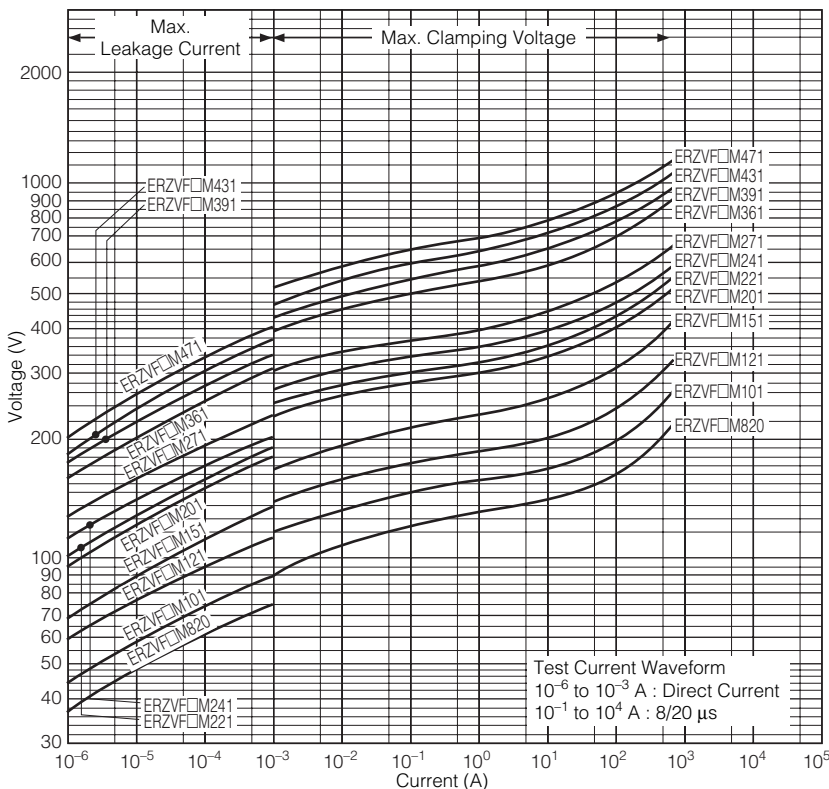
ERZVF1(2)M220 to ERZVF1(2)M680



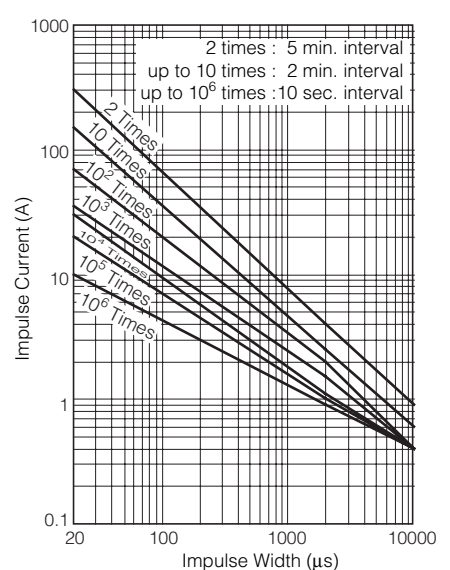
ERZVF1(2)M820 to ERZVF1(2)M271



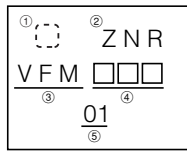
■ ERZVF1(2)M820 to ERZVF1(2)M471



ERZVF1(2)M331 to ERZVF1(2)M471



■ Marking Contents



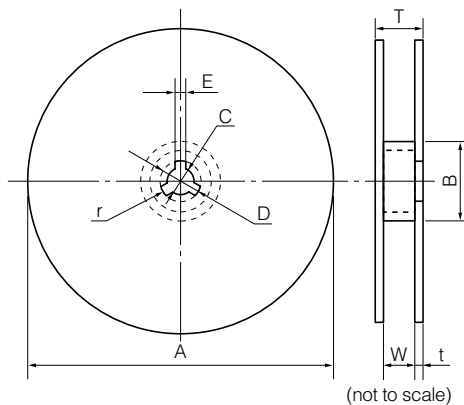
| | |
|----------------------------|---|
| ① Trade Mark | (Please confirm the product specifications) |
| ② Product Name | ZNR, ZNR Surge Absorbers |
| ③ Series | VF□M, VF Series |
| ④ Abbreviation of Part No. | The first two digits are significant figures and the third one denotes the number of zeros following. |
| ⑤ Date Code | Left(Year) 2006:F, 2007:G, 2008:H, 2009:J, 2010:0, 2011:1 Right(Month) Jan. to Sep.:1 to 9, Oct.:O, Nov.:N, Dec.:D |

■ Packaging Specifications

● Packing Quantity

| Style | Quantity |
|-----------------|----------------|
| Embossed taping | 2000 pcs./reel |
| Bulk | 200 pcs./bag |

● Reel

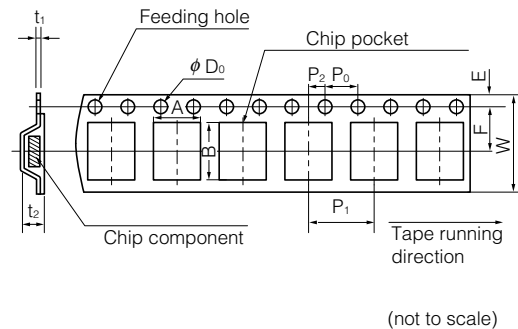


| Dimensions (mm) | A | B | C | D | E |
|-----------------|----------|---------|----------|----------|---------|
| | 382 max. | 50 min. | 13.0±0.5 | 21.0±0.8 | 2.0±0.5 |

| Dimensions (mm) | W | T | t | r |
|-----------------|------------------------------------|-----------|---------|-----|
| | 16.4 ^{+2.0} ₋₀ | 22.4 max. | 2.5±0.5 | 1.0 |

● Embossed Taping

(W=16 mm)



| Dimensions (mm) | A | B | W | F | E | P ₁ |
|-----------------|---------|-----------|----------|---------|-----------|----------------|
| | 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 ₂ | P ₀ | φD ₀ | t ₁ | t ₂ |
|-----------------|----------------|----------------|---------------------|----------------|----------------|
| | 2.0±0.1 | 4.0±0.1 | 1.5 ^{+0.1} | 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 I_{CmA} DC applied is called V_c or V_{CmA} . The measurement should be made as fast as possible to avoid heat effects. | 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 μ s). | | | | | | | | | | | | | |
| Rated Power | The maximum power that can be applied within the specified ambient temperature. | | | | | | | | | | | | | |
| Maximum Energy | Maximum energy of less than ± 10 % of the varistor voltage change when the standard impulse (2 ms) is applied one time. | | | | | | | | | | | | | |
| Maximum Peak Current | Maximum current of less than ± 10 % of the varistor voltage change when impulse current (8/20 μ s) is applied twice continuously with an 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 V_c shall be measured after the specified impulse is applied 10000 times continuously with an interval of 10 seconds at room temperature.</p> <table border="1"> <thead> <tr> <th>Part Number</th> <th>Waveform</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td>ERZVF□M220 to ERZVF□M680</td> <td>8/20 μs</td> <td>18 A</td> </tr> <tr> <td>ERZVF□M820 to ERZVF□M271</td> <td>8/20 μs</td> <td>50 A</td> </tr> <tr> <td>ERZVF□M331 to ERZVF□M471</td> <td>8/20 μs</td> <td>30 A</td> </tr> </tbody> </table> | Part Number | Waveform | Current | ERZVF□M220 to ERZVF□M680 | 8/20 μ s | 18 A | ERZVF□M820 to ERZVF□M271 | 8/20 μ s | 50 A | ERZVF□M331 to ERZVF□M471 | 8/20 μ s | 30 A | $\Delta V_{CmA}/V_{CmA} \leq \pm 10$ % |
| Part Number | Waveform | Current | | | | | | | | | | | | |
| ERZVF□M220 to ERZVF□M680 | 8/20 μ s | 18 A | | | | | | | | | | | | |
| ERZVF□M820 to ERZVF□M271 | 8/20 μ s | 50 A | | | | | | | | | | | | |
| ERZVF□M331 to ERZVF□M471 | 8/20 μ s | 30 A | | | | | | | | | | | | |
| Impulse Life (II) | <p>The change of V_c shall be measured after the specified impulse is applied 100000 times continuously with an interval of 10 seconds at room temperature.</p> <table border="1"> <thead> <tr> <th>Part Number</th> <th>Waveform</th> <th>Current</th> </tr> </thead> <tbody> <tr> <td>ERZVF□M220 to ERZVF□M680</td> <td>8/20 μs</td> <td>12 A</td> </tr> <tr> <td>ERZVF□M820 to ERZVF□M271</td> <td>8/20 μs</td> <td>35 A</td> </tr> <tr> <td>ERZVF□M331 to ERZVF□M471</td> <td>8/20 μs</td> <td>20 A</td> </tr> </tbody> </table> | Part Number | Waveform | Current | ERZVF□M220 to ERZVF□M680 | 8/20 μ s | 12 A | ERZVF□M820 to ERZVF□M271 | 8/20 μ s | 35 A | ERZVF□M331 to ERZVF□M471 | 8/20 μ s | 20 A | $\Delta V_{CmA}/V_{CmA} \leq \pm 10$ % |
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| ERZVF□M331 to ERZVF□M471 | 8/20 μ s | 20 A | | | | | | | | | | | | |