

## Description

The ZV Series of low voltage leaded multilayer varistors (MLVs) is designed to protect sensitive electronics devices operating in the low voltage region against high voltage / current surges. They offer excellent transient energy absorption due to improved energy volume distribution and power dissipation. Low voltage MLVs cover a wide DC operating voltage range from 3 to 56V.



## Features

- AC operating voltage (Vrms) from 2V to 40V
- DC operating voltage (Vdc) from 3V to 56V
- 5 model sizes available 05, 07, 10, 10, 14, 20
- Available with straight or crimped leads
- Broad range of current and energy handling capabilities
- +125°C continuous operating temperature (+150°C for ZVY)
- Dimensional and weight savings on PC board
- Bi-directional, lower clamping voltages than disc type varistors

## Applications

- Suppression of inductive switching or other transient events at the circuit board level
- Provides on-board transient voltage protection for ICs and transistors
- Used to help achieve electromagnetic compliance of end products
- Replace larger TVS Zener diodes in many applications

## General Technical Data

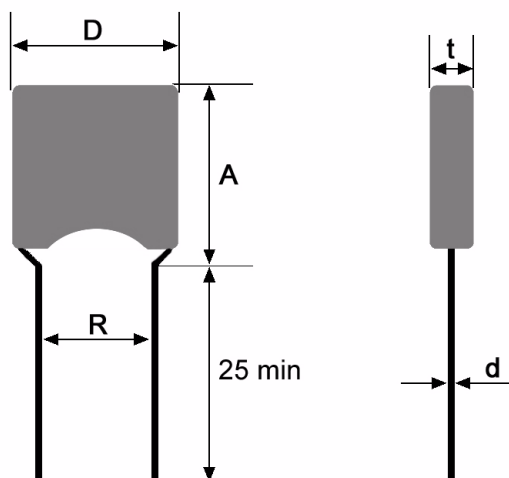
|   |                 |                                |
|---|-----------------|--------------------------------|
| Operating Temperature - ZV                | -40°C to +125°C | In accordance with CECC 42 000 |
| Operating Temperature - ZVY               | -40°C to +150°C |                                |
| Storage Temperature Range                 | -40°C to +150°C |                                |
| Threshold Voltage Temperature Coefficient | <-0.05%/°C      |                                |
| Insulation Resistance                     | >1Gohm          |                                |
| Isolation Voltage Capability              | >1kV            |                                |
| Response Time                             | < 25 nS         |                                |

## How to Order

| ZV              |                    | 1                 |                            | 14   |             | K                |                  | 10        |             | R                  |  |
|-----------------|--------------------|-------------------|----------------------------|------|-------------|------------------|------------------|-----------|-------------|--------------------|--|
| SEI Type        |                    | Lead style        |                            | Vrms |             | Tolerance        |                  | Chip Size |             | Packaging          |  |
| <b>SEI Type</b> | <b>Description</b> | <b>Model size</b> | <b>Version</b>             |      | <b>Code</b> | <b>Tolerance</b> | <b>Size (mm)</b> |           | <b>Code</b> | <b>Description</b> |  |
| ZV              | Standard           | 05, 07, 10        | 1 = Outward Crimped Leads  |      | K           | 10%              | 05               |           | B           | Bulk               |  |
| ZVY             | High Temp          | 14                | 1 = Straight Leads         |      | L           | 15%              | 07               |           | R           | Reel               |  |
|                 |                    | 14                | 5 = Straight Leads, Kinked |      | M           | 20%              | 10               |           | A           | Ammo Pack          |  |
|                 |                    | 20                | 1 = Inward Crimped Leads   |      |             |                  | 14               |           |             |                    |  |
|                 |                    |                   |                            |      |             |                  | 20               |           |             |                    |  |

## Standard Packaging Options / Quantities

| Series  | Voltage Range (Vrms) | Model Size | Packaging options 7mm, 10mm, 14mm, 20mm, and 23mm |       |       |
|---------|----------------------|------------|---|-------|-------|
|         |                      |            | B = Bulk; R = Reel; A = Ammo Pack                 |       |       |
|         |                      |            | B   | R     | A     |
| ZV, ZVY | 2 – 40               | 05         | 2,000   | 2,000 | 2,000 |
|         | 2 – 40               | 07         | 1,500   | 2,000 | 2,000 |
|         | 2 – 40               | 10         | 1,000   | 1,500 | 1,000 |
|         | 2 – 40               | 14         | 700   | 1,500 | 1,000 |
|         | 2 – 40               | 20         | 500   | 1,500 | 800   |



## Device Ratings and Dimensions

| Part Number | V <sub>RMS</sub><br>(volts) | V <sub>DC</sub><br>(volts) | V <sub>N</sub><br>(volts) | V <sub>C</sub><br>(volts) | I <sub>C</sub><br>(amps) | W <sub>MAX</sub><br>(joules) | P <sub>MAX</sub><br>(watts) | I <sub>p</sub><br>(amps) | C <sub>TYP</sub><br>(pF) | D <sub>MAX</sub><br>(mm) | t <sub>MAX</sub><br>(mm) | R<br>(mm) | d<br>(mm) | h <sub>MAX</sub><br>(mm) |
|-------------|-----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|------------------------------|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|-----------|--------------------------|
| ZV 2 M 05   | 2                           | 3                          | 4                         | 10                        | 1                        | 0.1                          | 0.005                       | 100                      | 1,300                    | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 4 M 05   | 4                           | 5.5                        | 8                         | 14                        | 1                        | 0.1                          | 0.005                       | 100                      | 1,100                    | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 6 M 05   | 6                           | 8                          | 11                        | 21                        | 1                        | 0.2                          | 0.005                       | 400                      | 900                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 8 M 05   | 8                           | 11                         | 15                        | 25                        | 1                        | 0.2                          | 0.005                       | 100                      | 700                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 11 M 05  | 11                          | 14                         | 18                        | 33                        | 1                        | 0.3                          | 0.005                       | 100                      | 500                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 14 M 05  | 14                          | 18                         | 22                        | 38                        | 1                        | 0.4                          | 0.005                       | 100                      | 400                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 17 M 05  | 17                          | 22                         | 27                        | 44                        | 1                        | 0.5                          | 0.005                       | 100                      | 340                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 20 M 05  | 20                          | 26                         | 33                        | 54                        | 1                        | 0.6                          | 0.005                       | 100                      | 300                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 25 M 05  | 25                          | 31                         | 39                        | 65                        | 1                        | 0.7                          | 0.005                       | 100                      | 510                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 30 M 05  | 30                          | 38                         | 47                        | 77                        | 1                        | 0.9                          | 0.005                       | 100                      | 450                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 35 M 05  | 35                          | 45                         | 56                        | 90                        | 1                        | 1.2                          | 0.005                       | 100                      | 410                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |
| ZV 40 M 05  | 40                          | 56                         | 68                        | 110                       | 1                        | 1.4                          | 0.005                       | 100                      | 370                      | 5                        | 7                        | 5         | 0.6       | 4.5                      |

|            |    |     |    |     |     |     |       |     |       |   |   |   |     |     |
|------------|----|-----|----|-----|-----|-----|-------|-----|-------|---|---|---|-----|-----|
| ZV 2 M 07  | 2  | 3   | 4  | 10  | 2.5 | 0.2 | 0.008 | 200 | 5,000 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 4 M 07  | 4  | 5.5 | 8  | 14  | 2.5 | 0.3 | 0.008 | 200 | 4,300 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 6 M 07  | 6  | 8   | 11 | 21  | 2.5 | 0.4 | 0.008 | 200 | 3,200 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 8 M 07  | 8  | 11  | 15 | 25  | 2.5 | 0.5 | 0.008 | 200 | 1,950 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 11 M 07 | 11 | 14  | 18 | 33  | 2.5 | 0.6 | 0.008 | 200 | 1,300 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 14 M 07 | 14 | 18  | 22 | 38  | 2.5 | 0.8 | 0.008 | 200 | 950   | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 17 M 07 | 17 | 22  | 27 | 44  | 2.5 | 0.9 | 0.008 | 200 | 740   | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 20 M 07 | 20 | 26  | 33 | 54  | 2.5 | 1.2 | 0.008 | 200 | 620   | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 25 M 07 | 25 | 31  | 39 | 65  | 2.5 | 1.4 | 0.008 | 200 | 1,150 | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 30 M 07 | 30 | 38  | 47 | 77  | 2.5 | 1.6 | 0.008 | 200 | 950   | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 35 M 07 | 35 | 45  | 56 | 90  | 2.5 | 2.2 | 0.008 | 200 | 950   | 7 | 9 | 5 | 0.6 | 4.5 |
| ZV 40 M 07 | 40 | 56  | 68 | 110 | 2.5 | 2.6 | 0.008 | 200 | 750   | 7 | 9 | 5 | 0.6 | 4.5 |

## Device Ratings and Dimensions

| Part Number | V <sub>RMS</sub><br>(volts) | V <sub>DC</sub><br>(volts) | V <sub>N</sub><br>(volts) | V <sub>C</sub><br>(volts) | I <sub>C</sub><br>(amps) | W <sub>MAX</sub><br>(joules) | P <sub>MAX</sub><br>(watts) | I <sub>p</sub><br>(amps) | C <sub>TYP</sub><br>(pF) | D <sub>MAX</sub><br>(mm) | t <sub>MAX</sub><br>(mm) | R<br>(mm) | d<br>(mm) | h <sub>MAX</sub><br>(mm) |
|-------------|-----------------------------|----------------------------|---------------------------|---------------------------|--------------------------|------------------------------|-----------------------------|--------------------------|--------------------------|--------------------------|--------------------------|-----------|-----------|--------------------------|
| ZV 4 M 10   | 4                           | 5.5                        | 8                         | 14                        | 5                        | 0.4                          | 0.01                        | 300                      | 5,000                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 6 M 10   | 6                           | 8                          | 11                        | 21                        | 5                        | 0.8                          | 0.01                        | 300                      | 4,100                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 8 M 10   | 8                           | 11                         | 15                        | 25                        | 5                        | 1.1                          | 0.01                        | 500                      | 3,400                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 11 M 10  | 11                          | 14                         | 18                        | 33                        | 5                        | 1.7                          | 0.01                        | 500                      | 2,600                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 14 M 10  | 14                          | 18                         | 22                        | 38                        | 5                        | 2.2                          | 0.01                        | 500                      | 2,150                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 17 M 10  | 17                          | 22                         | 27                        | 44                        | 5                        | 2.6                          | 0.01                        | 500                      | 1,800                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 20 M 10  | 20                          | 26                         | 33                        | 54                        | 5                        | 3.2                          | 0.01                        | 500                      | 1,500                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 25 M 10  | 25                          | 31                         | 39                        | 65                        | 5                        | 3.8                          | 0.01                        | 500                      | 1,350                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 30 M 10  | 30                          | 38                         | 47                        | 77                        | 5                        | 4.4                          | 0.01                        | 500                      | 1,100                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 35 M 10  | 35                          | 45                         | 56                        | 90                        | 5                        | 5.4                          | 0.01                        | 500                      | 1,000                    | 7                        | 9                        | 5         | 0.6       | 4.5                      |
| ZV 40 M 10  | 40                          | 56                         | 68                        | 110                       | 5                        | 6.4                          | 0.01                        | 500                      | 820                      | 7                        | 9                        | 5         | 0.6       | 4.5                      |

|            |    |     |    |     |    |      |       |       |        |   |    |   |     |     |
|------------|----|-----|----|-----|----|------|-------|-------|--------|---|----|---|-----|-----|
| ZV 4 M 14  | 4  | 5.5 | 8  | 14  | 10 | 0.8  | 0.015 | 500   | 10,000 | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 6 M 14  | 6  | 8   | 11 | 21  | 10 | 1.0  | 0.015 | 500   | 7,500  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 8 M 14  | 8  | 11  | 15 | 25  | 10 | 1.9  | 0.015 | 800   | 6,500  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 11 M 14 | 11 | 14  | 18 | 33  | 10 | 3.3  | 0.015 | 1,000 | 5,100  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 14 M 14 | 14 | 18  | 22 | 38  | 10 | 4.2  | 0.015 | 1,000 | 4,000  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 17 M 14 | 17 | 22  | 27 | 44  | 10 | 5.2  | 0.015 | 1,000 | 3,500  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 20 M 14 | 20 | 26  | 33 | 54  | 10 | 6.4  | 0.015 | 1,000 | 3,000  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 25 M 14 | 25 | 31  | 39 | 65  | 10 | 7.2  | 0.015 | 1,000 | 2,500  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 30 M 14 | 30 | 38  | 47 | 77  | 10 | 9.4  | 0.015 | 1,000 | 2,000  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 35 M 14 | 35 | 45  | 56 | 90  | 10 | 10.2 | 0.015 | 1,000 | 1,450  | 8 | 12 | 5 | 0.6 | 4.5 |
| ZV 40 M 14 | 40 | 56  | 68 | 110 | 10 | 13.4 | 0.015 | 1,000 | 1,100  | 8 | 12 | 5 | 0.6 | 4.5 |

|            |    |     |    |    |    |      |      |       |        |   |    |   |     |     |
|------------|----|-----|----|----|----|------|------|-------|--------|---|----|---|-----|-----|
| ZV 4 M 20  | 4  | 5.5 | 8  | 14 | 20 | 1.2  | 0.02 | 1,000 | 19,500 | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 6 M 20  | 6  | 8   | 11 | 21 | 20 | 3.8  | 0.02 | 1,000 | 17,000 | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 8 M 20  | 8  | 11  | 15 | 25 | 20 | 4.3  | 0.02 | 1,500 | 16,000 | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 11 M 20 | 11 | 14  | 18 | 33 | 20 | 10.5 | 0.02 | 2,000 | 13,000 | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 14 M 20 | 14 | 18  | 22 | 38 | 20 | 12.0 | 0.02 | 2,000 | 10,000 | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 17 M 20 | 17 | 22  | 27 | 44 | 20 | 14.2 | 0.02 | 2,000 | 8,000  | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 20 M 20 | 20 | 26  | 33 | 54 | 20 | 18.2 | 0.02 | 2,000 | 6,500  | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 25 M 20 | 25 | 31  | 39 | 65 | 20 | 22.4 | 0.02 | 2,000 | 5,000  | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 30 M 20 | 30 | 38  | 47 | 77 | 20 | 25.8 | 0.02 | 2,000 | 4,000  | 9 | 12 | 5 | 0.6 | 4.5 |
| ZV 35 M 20 | 35 | 45  | 56 | 90 | 20 | 33.4 | 0.02 | 2,000 | 3,000  | 9 | 12 | 5 | 0.6 | 4.5 |