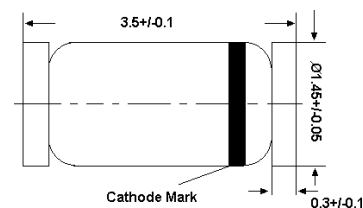


## Silicon Epitaxial Planar Zener Diodes

in MiniMELF case especially for automatic insertion.  
The Zener voltages are graded according to the international E24 standard. Smaller voltage tolerances and higher Zener voltages are upon request.



**Glass case MiniMELF**  
**Dimensions in mm**

LL-34

## REEL SPECIFICATION

| P/N                     | PKG  | QTY  |
|-------------------------|------|------|
| ZMM2V0-MS THRU ZMM75-MS | LL34 | 2500 |

## Absolute Maximum Ratings ( $T_a = 25\text{ }^{\circ}\text{C}$ )

| Parameter                                                                    | Symbol           | Value             | Unit               |
|------------------------------------------------------------------------------|------------------|-------------------|--------------------|
| Power Dissipation                                                            | $P_{\text{tot}}$ | 500 <sup>1)</sup> | mW                 |
| Junction Temperature                                                         | $T_j$            | 175               | $^{\circ}\text{C}$ |
| Storage Temperature Range                                                    | $T_{\text{stg}}$ | - 55 to + 175     | $^{\circ}\text{C}$ |
| <sup>1)</sup> Valid provided that electrodes are kept at ambient temperature |                  |                   |                    |

## Characteristics at $T_a = 25\text{ }^{\circ}\text{C}$

| Parameter                                                                    | Symbol           | Max.              | Unit |
|------------------------------------------------------------------------------|------------------|-------------------|------|
| Thermal Resistance Junction to Ambient Air                                   | $R_{\text{thA}}$ | 0.3 <sup>1)</sup> | K/mW |
| Forward Voltage<br>at $I_F = 100\text{ mA}$                                  | $V_F$            | 1                 | V    |
| <sup>1)</sup> Valid provided that electrodes are kept at ambient temperature |                  |                   |      |

**Characteristics at  $T_a = 25\text{ }^{\circ}\text{C}$** 

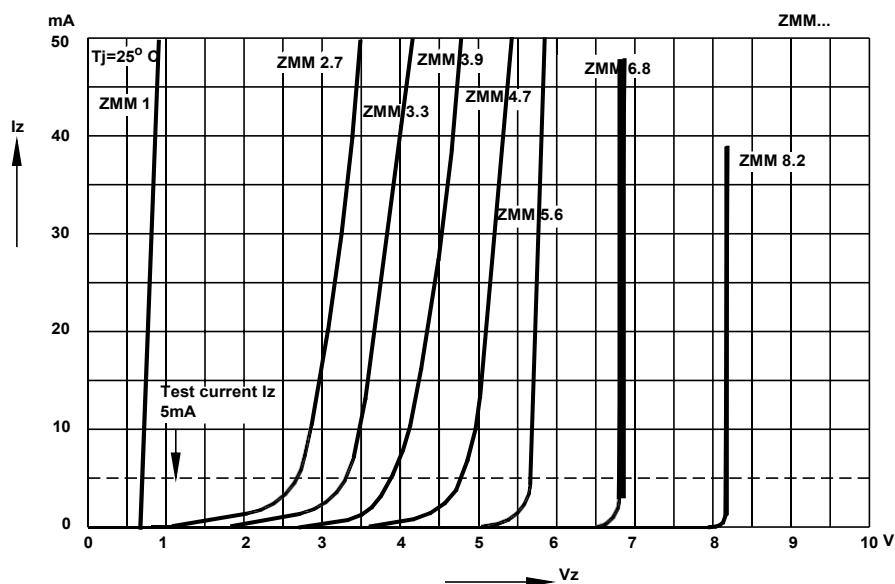
| P/N       | Zener Voltage Range <sup>1)</sup> |             |             | Dynamic Resistance |                   |             | Reverse Leakage Current            |                                     |          | Temp. Coefficient<br>of Zener Voltage |
|-----------|-----------------------------------|-------------|-------------|--------------------|-------------------|-------------|------------------------------------|-------------------------------------|----------|---------------------------------------|
|           | $V_{Zno}$<br>m                    | $V_{ZT}$    | at $I_{ZT}$ | $Z_{ZT}$           | $Z_{ZK}$          | at $I_{ZK}$ | $T_a = 25\text{ }^{\circ}\text{C}$ | $T_a = 125\text{ }^{\circ}\text{C}$ | at $V_R$ |                                       |
|           | (V)                               | (V)         | (mA)        | Max. ( $\Omega$ )  | Max. ( $\Omega$ ) | (mA)        | Max. ( $\mu\text{A}$ )             | Max. ( $\mu\text{A}$ )              | (V)      |                                       |
| ZMM2V0-MS | 2.0                               | 1.8...2.15  | 5           | 85                 | 600               | 1           | 100                                | 200                                 | 1        | -0.09...-0.06                         |
| ZMM2V2-MS | 2.2                               | 2.08...2.33 | 5           | 85                 | 600               | 1           | 75                                 | 160                                 | 1        | -0.09...-0.06                         |
| ZMM2V4-MS | 2.4                               | 2.28...2.56 | 5           | 85                 | 600               | 1           | 50                                 | 100                                 | 1        | -0.09...-0.06                         |
| ZMM2V7-MS | 2.7                               | 2.5...2.9   | 5           | 85                 | 600               | 1           | 10                                 | 50                                  | 1        | -0.09...-0.06                         |
| ZMM3V0-MS | 3.0                               | 2.8...3.2   | 5           | 85                 | 600               | 1           | 4                                  | 40                                  | 1        | -0.08...-0.05                         |
| ZMM3V3-MS | 3.3                               | 3.1...3.5   | 5           | 85                 | 600               | 1           | 2                                  | 40                                  | 1        | -0.08...-0.05                         |
| ZMM3V6-MS | 3.6                               | 3.4...3.8   | 5           | 85                 | 600               | 1           | 2                                  | 40                                  | 1        | -0.08...-0.05                         |
| ZMM3V9-MS | 3.9                               | 3.7...4.1   | 5           | 85                 | 600               | 1           | 2                                  | 40                                  | 1        | -0.08...-0.05                         |
| ZMM4V3-MS | 4.3                               | 4...4.6     | 5           | 75                 | 600               | 1           | 1                                  | 20                                  | 1        | -0.06...-0.03                         |
| ZMM4V7-MS | 4.7                               | 4.4...5     | 5           | 60                 | 600               | 1           | 0.5                                | 10                                  | 1        | -0.05...+0.02                         |
| ZMM5V1-MS | 5.1                               | 4.8...5.4   | 5           | 35                 | 550               | 1           | 0.1                                | 2                                   | 1        | -0.02...+0.02                         |
| ZMM5V6-MS | 5.6                               | 5.2...6     | 5           | 25                 | 450               | 1           | 0.1                                | 2                                   | 1        | -0.05...+0.05                         |
| ZMM6V2-MS | 6.2                               | 5.8...6.6   | 5           | 10                 | 200               | 1           | 0.1                                | 2                                   | 2        | 0.03...0.06                           |
| ZMM6V8-MS | 6.8                               | 6.4...7.2   | 5           | 8                  | 150               | 1           | 0.1                                | 2                                   | 3        | 0.03...0.07                           |
| ZMM7V5-MS | 7.5                               | 7...7.9     | 5           | 7                  | 50                | 1           | 0.1                                | 2                                   | 5        | 0.03...0.07                           |
| ZMM8V2-MS | 8.2                               | 7.7...8.7   | 5           | 7                  | 50                | 1           | 0.1                                | 2                                   | 6.2      | 0.03...0.08                           |
| ZMM9V1-MS | 9.1                               | 8.5...9.6   | 5           | 10                 | 50                | 1           | 0.1                                | 2                                   | 6.8      | 0.03...0.09                           |
| ZMM10-MS  | 10                                | 9.4...10.6  | 5           | 15                 | 70                | 1           | 0.1                                | 2                                   | 7.5      | 0.03...0.1                            |
| ZMM11-MS  | 11                                | 10.4...11.6 | 5           | 20                 | 70                | 1           | 0.1                                | 2                                   | 8.2      | 0.03...0.11                           |
| ZMM12-MS  | 12                                | 11.4...12.7 | 5           | 20                 | 90                | 1           | 0.1                                | 2                                   | 9.1      | 0.03...0.11                           |
| ZMM13-MS  | 13                                | 12.4...14.1 | 5           | 26                 | 110               | 1           | 0.1                                | 2                                   | 10       | 0.03...0.11                           |
| ZMM15-MS  | 15                                | 13.8...15.6 | 5           | 30                 | 110               | 1           | 0.1                                | 2                                   | 11       | 0.03...0.11                           |
| ZMM16-MS  | 16                                | 15.3...17.1 | 5           | 40                 | 170               | 1           | 0.1                                | 2                                   | 12       | 0.03...0.11                           |
| ZMM18-MS  | 18                                | 16.8...19.1 | 5           | 50                 | 170               | 1           | 0.1                                | 2                                   | 13       | 0.03...0.11                           |
| ZMM20-MS  | 20                                | 18.8...21.2 | 5           | 55                 | 220               | 1           | 0.1                                | 2                                   | 15       | 0.03...0.11                           |
| ZMM22-MS  | 22                                | 20.8...23.3 | 5           | 55                 | 220               | 1           | 0.1                                | 2                                   | 16       | 0.04...0.12                           |
| ZMM24-MS  | 24                                | 22.8...25.6 | 5           | 80                 | 220               | 1           | 0.1                                | 2                                   | 18       | 0.04...0.12                           |
| ZMM27-MS  | 27                                | 25.1...28.9 | 5           | 80                 | 220               | 1           | 0.1                                | 2                                   | 20       | 0.04...0.12                           |
| ZMM30-MS  | 30                                | 28...32     | 5           | 80                 | 220               | 1           | 0.1                                | 2                                   | 22       | 0.04...0.12                           |
| ZMM33-MS  | 33                                | 31...35     | 5           | 80                 | 220               | 1           | 0.1                                | 2                                   | 24       | 0.04...0.12                           |
| ZMM36-MS  | 36                                | 34...38     | 5           | 80                 | 220               | 1           | 0.1                                | 2                                   | 27       | 0.04...0.12                           |
| ZMM39-MS  | 39                                | 37...41     | 2.5         | 90                 | 500               | 0.5         | 0.1                                | 5                                   | 30       | 0.04...0.12                           |
| ZMM43-MS  | 43                                | 40...46     | 2.5         | 90                 | 500               | 0.5         | 0.1                                | 5                                   | 33       | 0.04...0.12                           |
| ZMM47-MS  | 47                                | 44...50     | 2.5         | 110                | 600               | 0.5         | 0.1                                | 5                                   | 36       | 0.04...0.12                           |
| ZMM51-MS  | 51                                | 48...54     | 2.5         | 125                | 700               | 0.5         | 0.1                                | 10                                  | 39       | 0.04...0.12                           |
| ZMM56-MS  | 56                                | 52...60     | 2.5         | 135                | 700               | 0.5         | 0.1                                | 10                                  | 43       | 0.04...0.12                           |
| ZMM62-MS  | 62                                | 58...66     | 2.5         | 150                | 1000              | 0.5         | 0.1                                | 10                                  | 47       | 0.04...0.12                           |
| ZMM68-MS  | 68                                | 64...72     | 2.5         | 200                | 1000              | 0.5         | 0.1                                | 10                                  | 51       | 0.04...0.12                           |
| ZMM75-MS  | 75                                | 70...79     | 2.5         | 250                | 1000              | 0.5         | 0.1                                | 10                                  | 56       | 0.04...0.12                           |

<sup>1)</sup> Tested with pulses  $t_p = 20\text{ ms}$ .

<sup>2)</sup> The ZMM1 is a silicon diode with operation in forward direction. Hence, the index of all parameters should be "F" instead of "Z". Connect the cathode electrode to the negative pole.

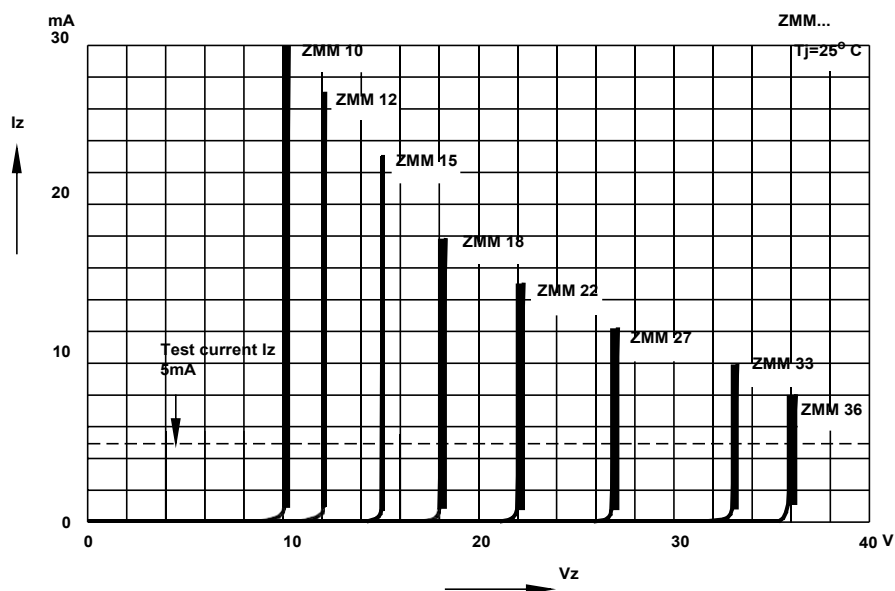
### Breakdown characteristics

$T_j = \text{constant (pulsed)}$

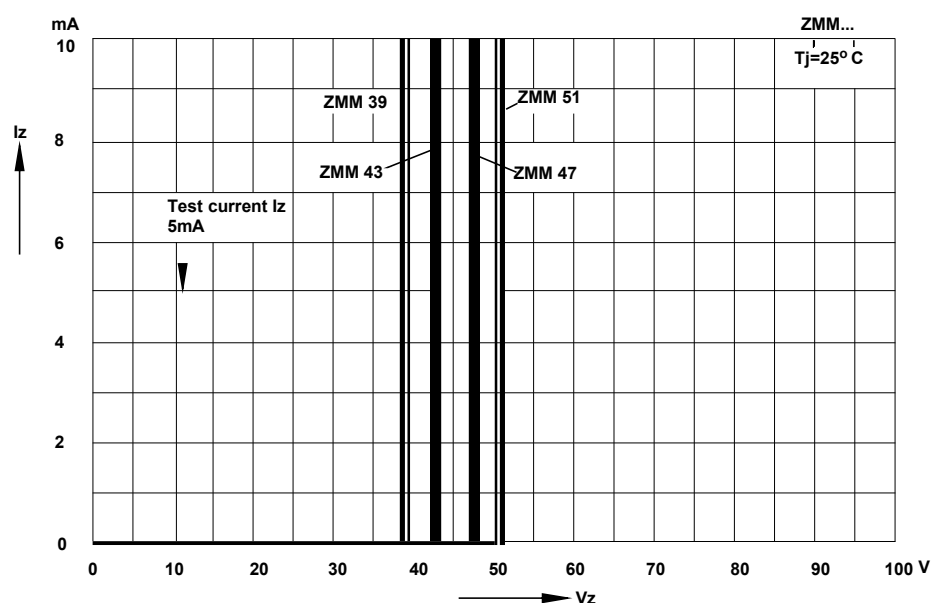


### Breakdown characteristics

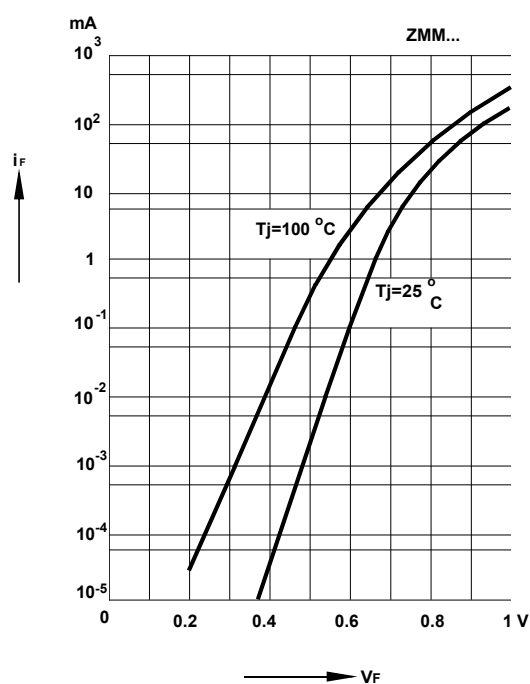
$T_j = \text{constant (pulsed)}$



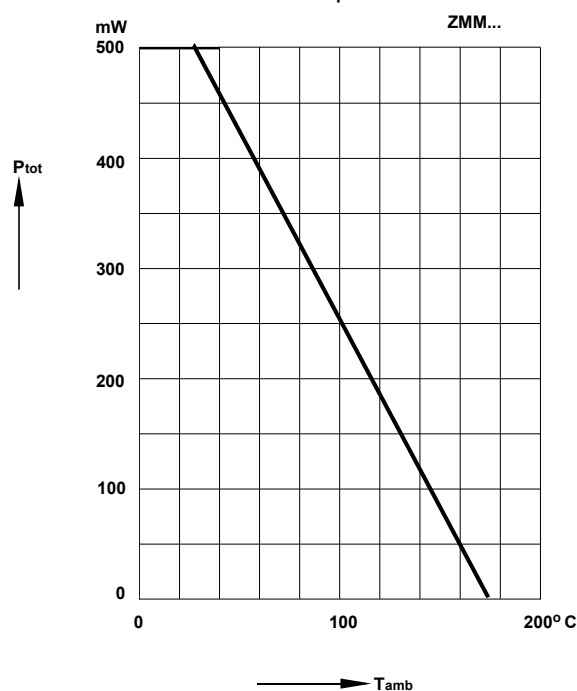
**Breakdown characteristics**  
 $T_j = \text{constant (pulsed)}$

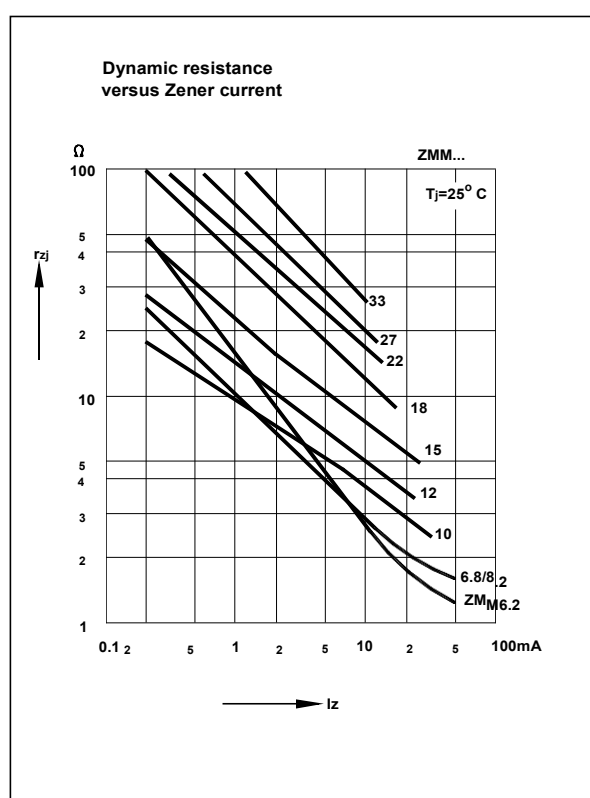
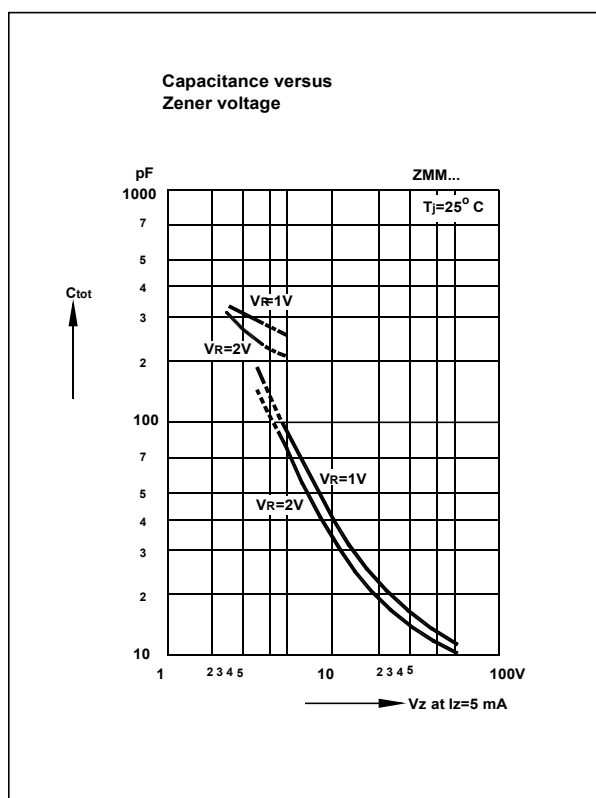
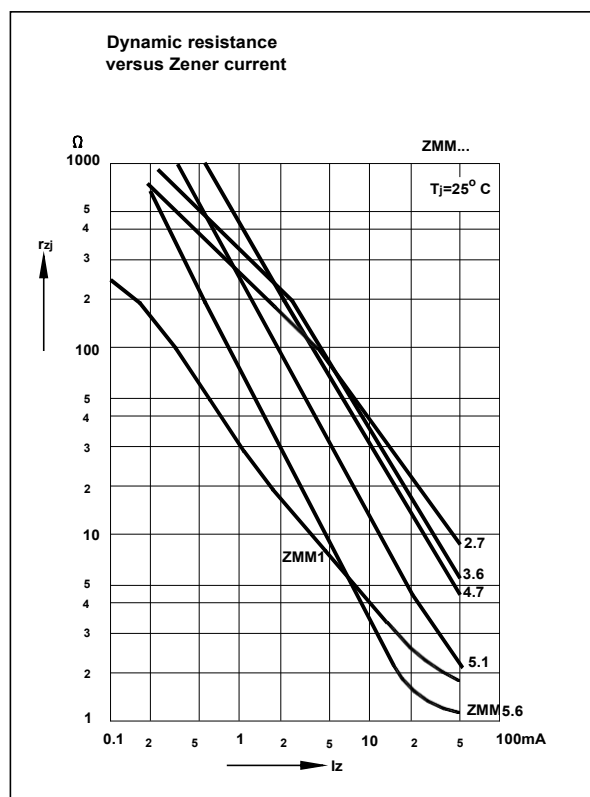
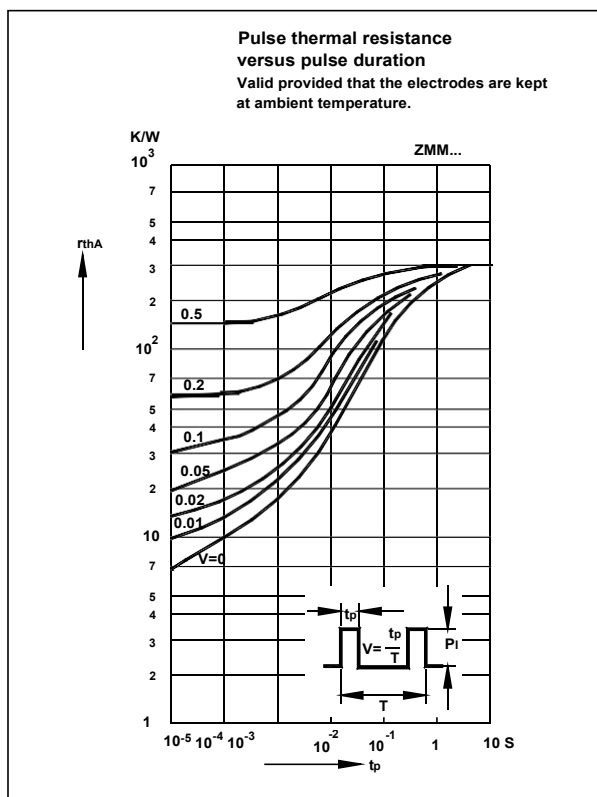


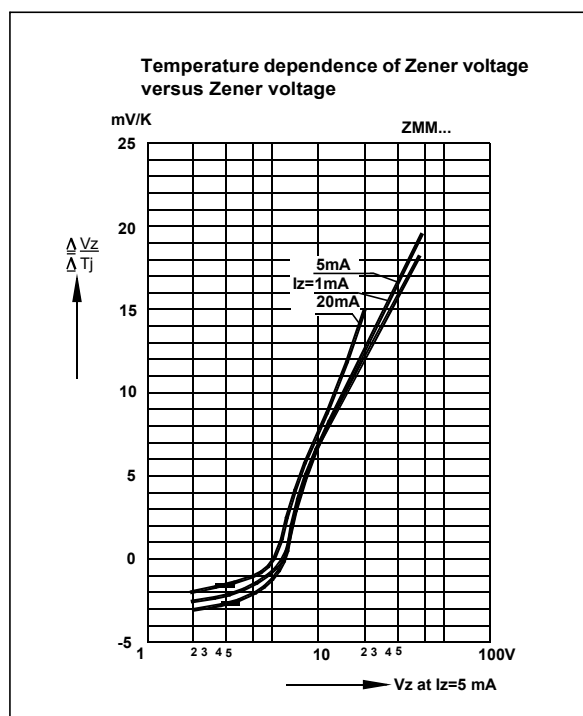
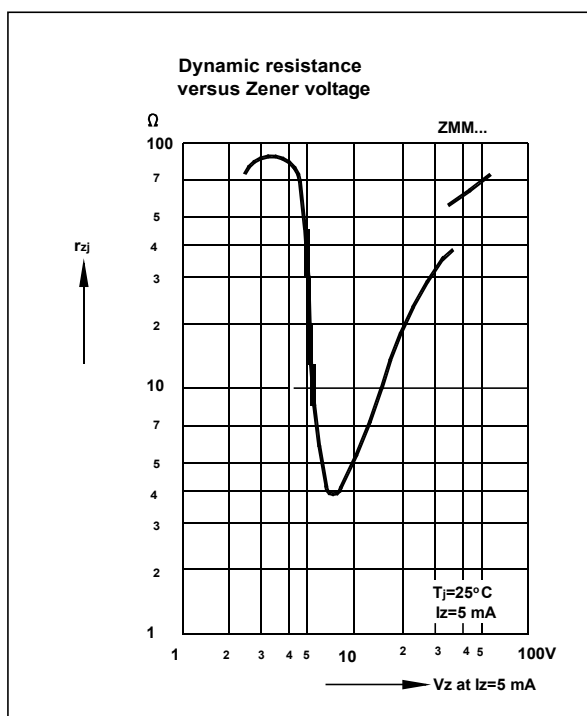
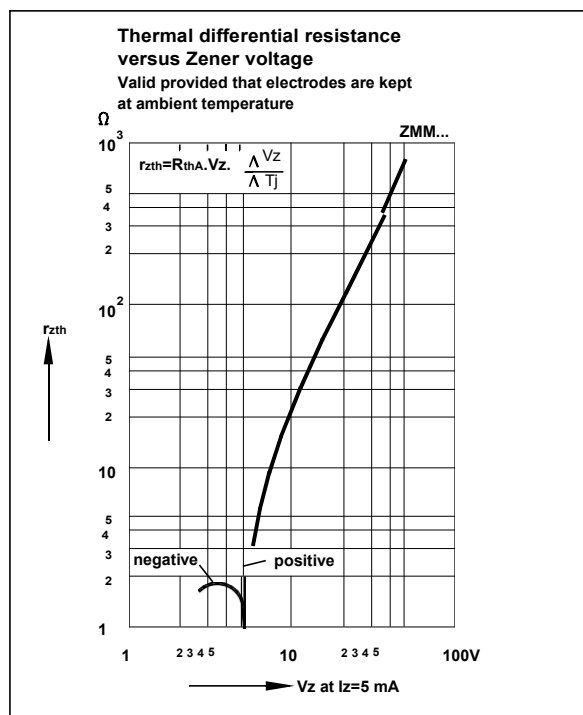
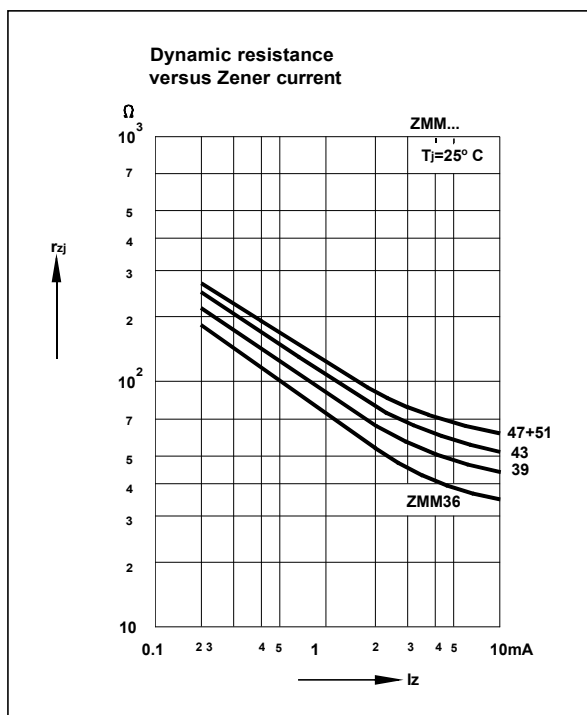
**Forward characteristics**



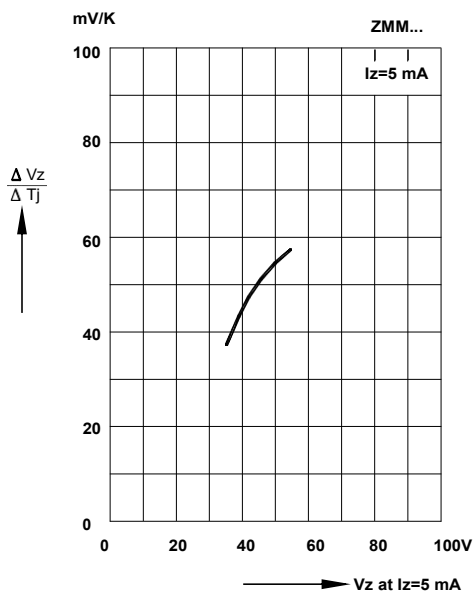
**Admissible power dissipation versus ambient temperature**  
Valid provided that electrodes are kept at ambient temperature.



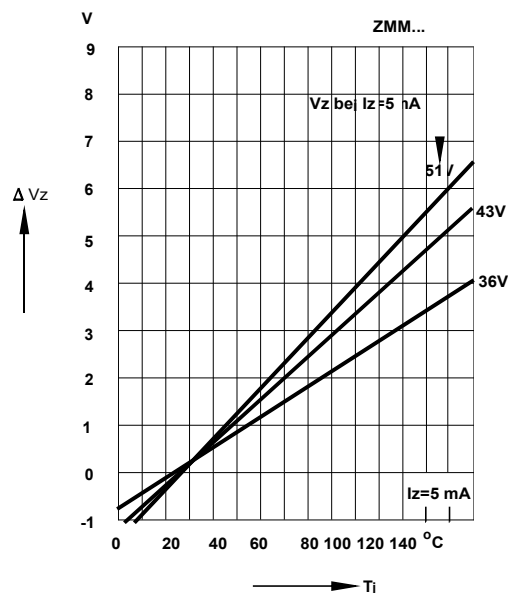




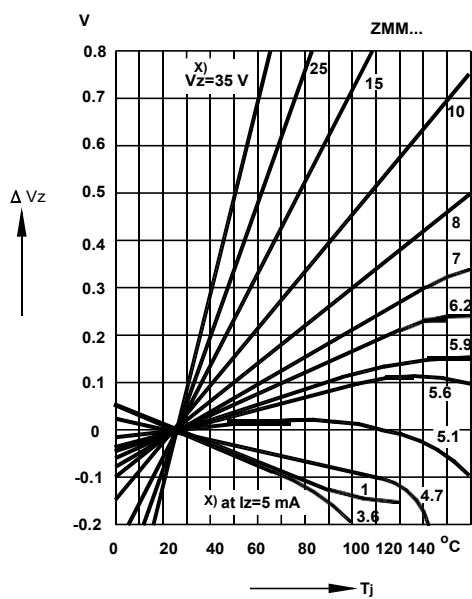
Temperature dependence of Zener voltage  
versus Zener voltage



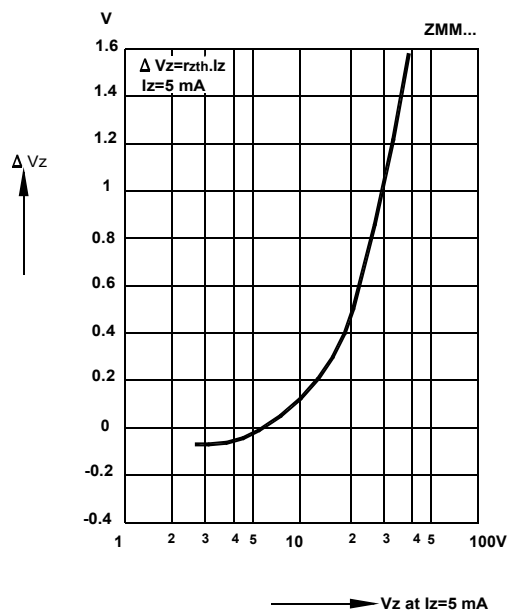
Change of Zener voltage  
versus junction temperature

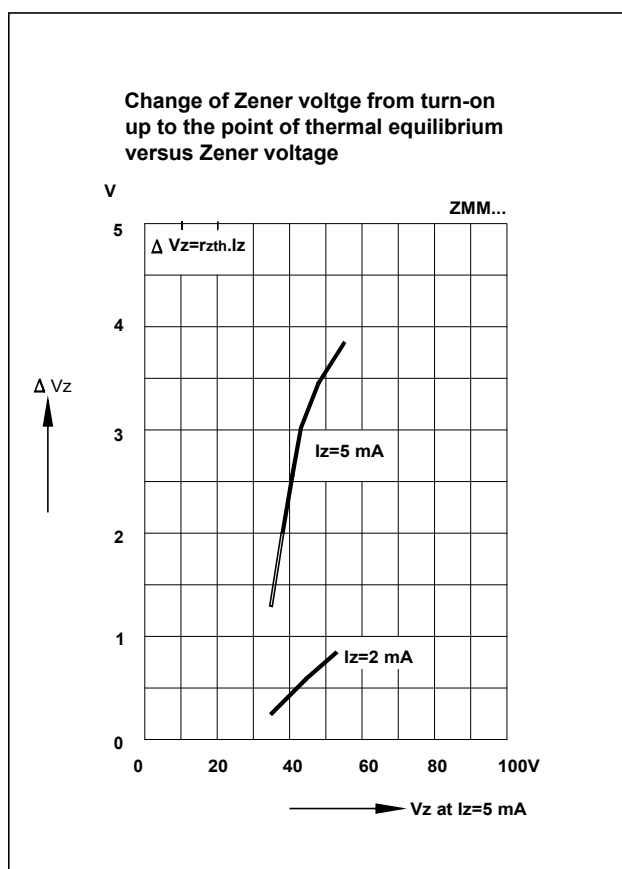


Change of Zener voltage  
versus junction temperature



Change of Zener voltage from turn-on  
up to the point of thermal equilibrium  
versus Zener voltage





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