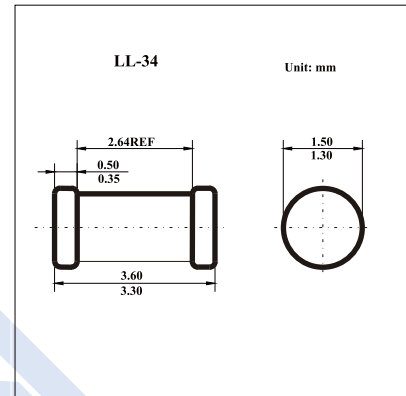


## Zener Diodes

**KMM1B THRU KMM75B**  
**KMM1C THRU KMM75C**  
 (ZMM1 THRU ZMM75)

■ Features

- Silicon planar zener diodes
- In miniMELE case especially for automatic insertion
- The zener voltages are graded according to the international E 24 standard . Offered with either 5% or 2% tolerance. Smaller voltage tolerance and other zener voltages are available upon request.



■ Absolute Maximum Ratings  $T_a = 25^\circ\text{C}$

| Parameter   | Symbol          | Rating      | Unit                      |
|---|-----------------|-------------|---------------------------|
| Power dissipation (Note 1)                          | $P_D$           | 500         | mW                        |
| Thermal resistance junction to ambient air (Note 1) | $R_{\theta JA}$ | 300         | $^\circ\text{C}/\text{W}$ |
| Junction temperature                                | $T_j$           | 175         | $^\circ\text{C}$          |
| Storage temperature range                           | $T_{stg}$       | -55 to +175 | $^\circ\text{C}$          |

Notes: 1. Valid provided that Electrodes are kept at Ambient Temperature.

■ Classification

|       |                   |                   |
|-------|-------------------|-------------------|
| NO:   | KMM1B THRU KMM75B | KMM1C THRU KMM75C |
| Range | B=±2%             | C=±5%             |

## KMM1B THRU KMM75B KMM1C THRU KMM75C

■ Electrical characteristics (TA=25°C unless otherwise noted)

| Type                | Dynamic Resistance                |                                   | Temp. Coefficient of Zener Voltage at IZ= 5 mA |      | Maximum Reverse Leakage Current |              | Admissible Zener Current <sup>(2)</sup> |                  |
|---------------------|-----------------------------------|-----------------------------------|--|------|---------------------------------|--------------|---|------------------|
|                     | at IZ= 5 mA<br>f= 1 kHz<br>rzj(Ω) | at IZ= 1 mA<br>f= 1 kHz<br>rzj(Ω) | °vz (10 <sup>-4</sup> /°C)                     |      | IR<br>(μA)                      | at VR<br>(V) | at<br>Tamb=45 °C                        | at<br>Tamb=25 °C |
|                     |                                   |                                   | min.   | max. |                                 |              | Iz (mA)                                 | Iz (mA)          |
| KMM1 <sup>(3)</sup> | 6.5(<8)                           | <50                               | -26  | -23  |                                 |              | 280                                     | 340              |
| KMM2.4              | <100                              | <600                              | -10  | -5   | 50                              | 0.8          | 152                                     | 175              |
| KMM2.7              | 75(<83)                           | <500                              | -9   | -4   | 20                              | 0.8          | 135                                     | 160              |
| KMM3                | 80(<95)                           | <500                              | -9   | -3   | 20                              | 0.8          | 117                                     | 140              |
| KMM3.3              | 80(<95)                           | <500                              | -8   | -3   | 6                               | 0.8          | 109                                     | 130              |
| KMM3.6              | 80(<95)                           | <500                              | -8   | -3   | 6                               | 0.8          | 11                                      | 120              |
| KMM3.9              | 80(<95)                           | <500                              | -7   | -3   | 1.6                             | 0.8          | 92                                      | 110              |
| KMM4.3              | 80(<95)                           | <500                              | -6   | -1   | 1.0                             | 0.8          | 85                                      | 100              |
| KMM4.7              | 70(<78)                           | <500                              | -5   | +2   | 0.1                             | 0.8          | 76                                      | 90               |
| KMM5.1              | 30(<60)                           | <480                              | -3   | +4   | 0.1                             | 0.8          | 67                                      | 80               |
| KMM5.6              | 10(<40)                           | <400                              | -2   | +6   | 0.1                             | 1            | 59                                      | 70               |
| KMM6.2              | 4.8(<10)                          | <200                              | -1   | +7   | 0.1                             | 2            | 54                                      | 64               |
| KMM6.8              | 4.5(<8)                           | <150                              | +2   | +7   | 0.1                             | 3            | 49                                      | 58               |
| KMM7.5              | 4(<7)                             | <50                               | +3   | +7   | 0.1                             | 5            | 44                                      | 53               |
| KMM8.2              | 4.5(<7)                           | <50                               | +4   | +7   | 0.1                             | 6            | 40                                      | 47               |
| KMM9.1              | 4.8(<10)                          | <50                               | +5   | +8   | 0.1                             | 7            | 36                                      | 43               |
| KMM10               | 5.2(<15)                          | <70                               | +5   | +8   | 0.1                             | 7.5          | 33                                      | 40               |
| KMM11               | 6(<20)                            | <70                               | +5   | +9   | 0.1                             | 8.5          | 30                                      | 36               |
| KMM12               | 7(<20)                            | <90                               | +6   | +9   | 0.1                             | 9            | 28                                      | 32               |
| KMM13               | 9(<25)                            | <110                              | +7   | +9   | 0.1                             | 10           | 25                                      | 29               |
| KMM15               | 11(<30)                           | <110                              | +7   | +9   | 0.1                             | 11           | 23                                      | 27               |
| KMM16               | 13(<40)                           | <170                              | +8   | +9.5 | 0.1                             | 12           | 20                                      | 24               |
| KMM18               | 18(<50)                           | <170                              | +8   | +9.5 | 0.1                             | 14           | 18                                      | 21               |
| KMM20               | 20(<50)                           | <220                              | +8   | +10  | 0.1                             | 15           | 17                                      | 20               |
| KMM22               | 25(<55)                           | <220                              | +8   | +10  | 0.1                             | 17           | 16                                      | 18               |
| KMM24               | 28(<80)                           | <220                              | +8   | +10  | 0.1                             | 18           | 13                                      | 16               |
| KMM27               | 30(<80)                           | <250                              | +8   | +10  | 0.1                             | 20           | 12                                      | 14               |
| KMM30               | 35(<80)                           | <250                              | +8   | +10  | 0.1                             | 22.5         | 10                                      | 13               |
| KMM33               | 40(<80)                           | <250                              | +8   | +10  | 0.1                             | 25           | 9                                       | 12               |
| KMM36               | 40(<90)                           | <250                              | +8   | +10  | 0.1                             | 27           | 9                                       | 11               |
| KMM39               | 50(<90)                           | <300                              | +10  | +12  | 0.1                             | 29           | 8                                       | 10               |
| KMM43               | 60(<100)                          | <700                              | +10  | +12  | 0.1                             | 32           | 7                                       | 9.2              |
| KMM47               | 70(<100)                          | <750                              | +10  | +12  | 0.1                             | 35           | 6                                       | 8.5              |
| KMM51               | 70(<100)                          | <750                              | +10  | +12  | 0.1                             | 38           | 6                                       | 7.8              |
| KMM56               | <135 <sup>(4)</sup>               | <1000 <sup>(5)</sup>              | typ. +10 <sup>(4)</sup>                        |      | 0.1                             | 42           | 5.2                                     | 7.1              |
| KMM62               | <150 <sup>(4)</sup>               | <1000 <sup>(5)</sup>              | typ. +10 <sup>(4)</sup>                        |      | 0.1                             | 47           | 4.8                                     | 6.4              |
| KMM68               | <200 <sup>(4)</sup>               | <1000 <sup>(5)</sup>              | typ. +10 <sup>(4)</sup>                        |      | 0.1                             | 51           | 4.1                                     | 5.8              |
| KMM75               | <250 <sup>(4)</sup>               | <1500 <sup>(5)</sup>              | typ. +10 <sup>(4)</sup>                        |      | 0.1                             | 55           | 3.9                                     | 5.3              |

notes: (1) Tested with pulses tp=5ms

(2) Valid provided that electrodes are kept at ambient temperature

(3) The ZMM1 is a silicon diode operated in forward direction. Hence, the index of all parameters should be "F" instead of "Z". Connect the cathode electrode to the negative pole.

(4) at Iz=2.5 mA

(5) at Iz=0.5 mA

## KMM1B THRU KMM75B KMM1C THRU KMM75C

■ Electrical characteristics (TA=25°C unless otherwise noted)

| type<br>±5% Tol.     | Zener Voltage range <sup>(1)</sup> at<br>Iz<br>Vz(V) |      | Test Current<br>Iz (mA) | type<br>±2% Tol.     | Zener Voltage range <sup>(1)</sup><br>at Iz<br>Vz(V) |      | Test Current Iz<br>(mA) |
|----------------------|--|------|-------------------------|----------------------|--|------|-------------------------|
|                      | min.   | max. |                         |                      | min.   | max. |                         |
| KMM1C <sup>(3)</sup> | 0.70   | 0.80 | 5.0                     | KMM1B <sup>(3)</sup> |  |      |                         |
| KMM2.4C              | 2.20   | 2.60 | 5.0                     | KMM2.4B              |  |      |                         |
| KMM2.7C              | 2.50   | 2.90 | 5.0                     | KMM2.7B              | 2.65   | 2.75 | 5.0                     |
| KMM3C                | 2.80   | 3.20 | 5.0                     | K MM3 B              | 2.94   | 3.06 | 5.0                     |
| KMM3.3C              | 3.10   | 3.50 | 5.0                     | KMM3.3B              | 3.23   | 3.37 | 5.0                     |
| KMM3.6C              | 3.40   | 3.80 | 5.0                     | KMM3.6B              | 3.53   | 3.67 | 5.0                     |
| KMM3.9C              | 3.70   | 4.10 | 5.0                     | KMM3.9B              | 3.82   | 3.98 | 5.0                     |
| KMM4.3C              | 4.00   | 4.60 | 5.0                     | KMM4.3B              | 4.21   | 4.39 | 5.0                     |
| KMM4.7C              | 4.40   | 5.00 | 5.0                     | KMM4.7B              | 4.61   | 4.79 | 5.0                     |
| KMM5.1C              | 4.80   | 5.40 | 5.0                     | KMM5.1B              | 5.00   | 5.20 | 5.0                     |
| KMM5.6C              | 5.20   | 6.00 | 5.0                     | KMM5.6B              | 5.49   | 5.71 | 5.0                     |
| KMM6.2C              | 5.80   | 6.60 | 5.0                     | KMM6.2B              | 6.08   | 6.32 | 5.0                     |
| KMM6.8C              | 6.40   | 7.20 | 5.0                     | KMM6.8B              | 6.66   | 6.94 | 5.0                     |
| KMM7.5C              | 7.00   | 7.90 | 5.0                     | KMM7.5B              | 7.35   | 7.65 | 5.0                     |
| KMM8.2C              | 7.70   | 8.70 | 5.0                     | KMM8.2B              | 8.04   | 8.36 | 5.0                     |
| KMM9.1C              | 8.50   | 9.60 | 5.0                     | KMM9.1B              | 8.92   | 9.28 | 5.0                     |
| KMM10C               | 9.4  | 10.6 | 5.0                     | K MM10 B             | 9.80   | 10.2 | 5.0                     |
| KMM11C               | 10.4   | 11.6 | 5.0                     | K MM11 B             | 10.8   | 11.2 | 5.0                     |
| KMM12C               | 11.4   | 12.7 | 5.0                     | K MM12 B             | 11.8   | 12.2 | 5.0                     |
| KMM13C               | 12.4   | 14.1 | 5.0                     | K MM13 B             | 12.7   | 13.3 | 5.0                     |
| KMM15C               | 13.8   | 15.6 | 5.0                     | K MM15B              | 14.7   | 15.3 | 5.0                     |
| KMM16C               | 15.3   | 17.1 | 5.0                     | K MM16B              | 15.7   | 16.3 | 5.0                     |
| KMM18C               | 16.8   | 19.1 | 5.0                     | K MM18B              | 17.6   | 18.4 | 5.0                     |
| KMM20C               | 18.8   | 21.2 | 5.0                     | K MM20B              | 19.6   | 20.4 | 5.0                     |
| KMM22C               | 20.8   | 23.3 | 5.0                     | K MM22 B             | 21.6   | 22.4 | 5.0                     |
| KMM24C               | 22.8   | 25.6 | 5.0                     | K MM24 B             | 23.5   | 24.5 | 5.0                     |
| KMM27C               | 25.1   | 28.9 | 5.0                     | K MM27B              | 26.5   | 27.5 | 5.0                     |
| KMM30C               | 28.0   | 32.0 | 5.0                     | K MM30B              | 29.4   | 30.6 | 5.0                     |
| KMM33C               | 31.0   | 35.0 | 5.0                     | K MM33B              | 32.3   | 33.7 | 5.0                     |
| KMM36C               | 34.0   | 38.0 | 5.0                     | K MM36B              | 35.3   | 36.7 | 5.0                     |
| KMM39C               | 37.0   | 41.0 | 5.0                     | K MM39B              | 38.2   | 39.8 | 5.0                     |
| KMM43C               | 40.0   | 46.0 | 5.0                     | K MM43B              | 42.1   | 43.9 | 5.0                     |
| KMM47C               | 44.0   | 50.0 | 5.0                     | K MM47B              | 46.1   | 47.9 | 5.0                     |
| KMM51C               | 48.0   | 54.0 | 5.0                     | K MM51B              | 50.0   | 52.0 | 5.0                     |
| KMM56C               | 52.0   | 60.0 | 2.5                     | K MM56B              | 54.9   | 46.9 | 2.5                     |
| KMM62C               | 58.0   | 66.0 | 2.5                     | K MM62B              | 60.8   | 63.2 | 2.5                     |
| KMM68C               | 64.0   | 72.0 | 2.5                     | K MM68B              | 66.6   | 69.4 | 2.5                     |
| KMM75C               | 70.0   | 79.0 | 2.5                     | K MM75B              | 73.5   | 76.5 | 2.5                     |

notes: (1) Tested with pulses tp=5ms

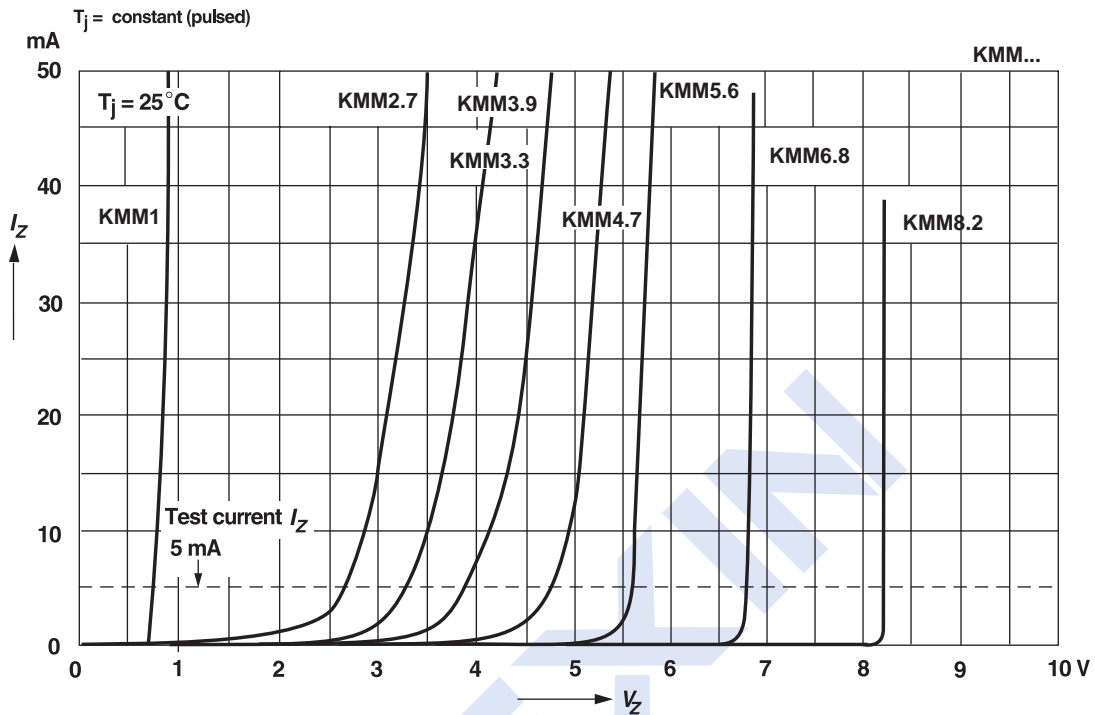
(2) Valid provided that electrodes are kept at ambient temperature

(3) The ZMM1 is a silicon diode operated in forward direction. Hence, the index of all parameters should be "F" instead of "Z". Connect the cathode electrode to the negative pole.

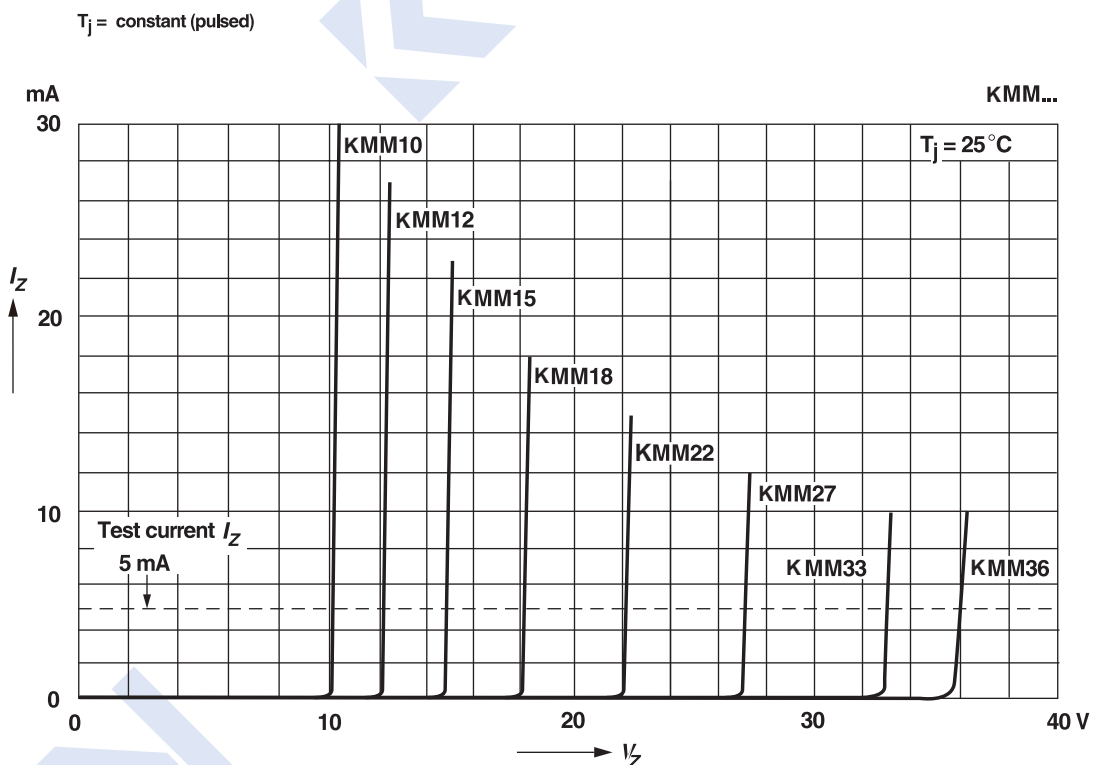
## KMM1B THRU KMM75B KMM1C THRU KMM75C

■ Typical Characteristics

**Breakdown characteristics**



**Breakdown characteristics**

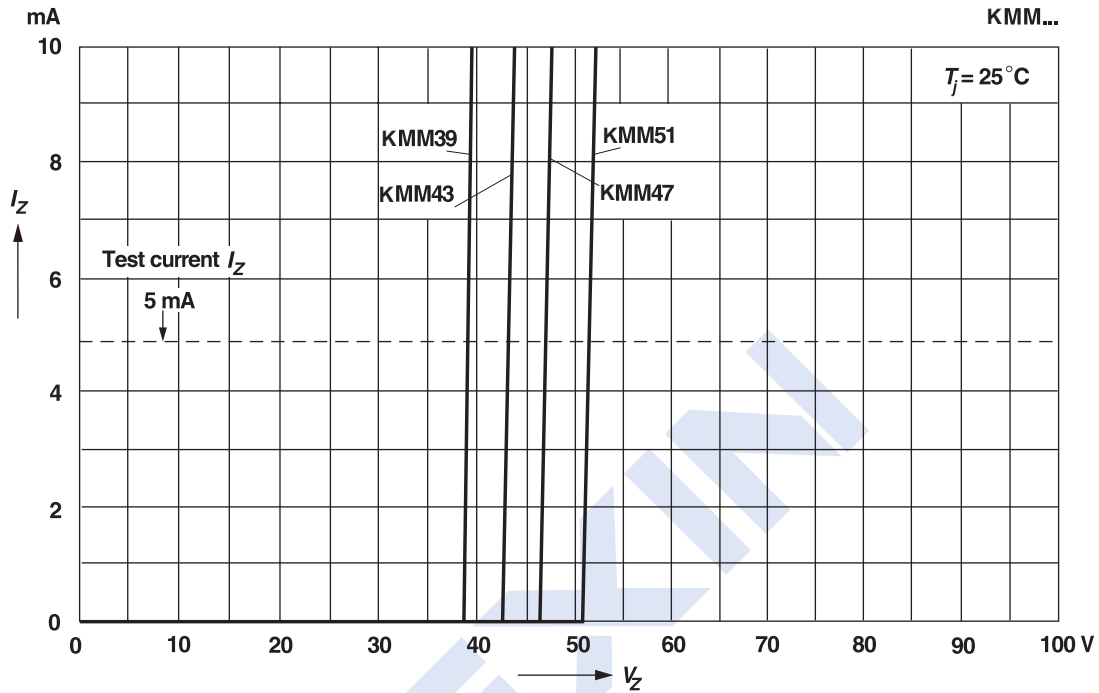


# KMM1B THRU KMM75B KMM1C THRU KMM75C

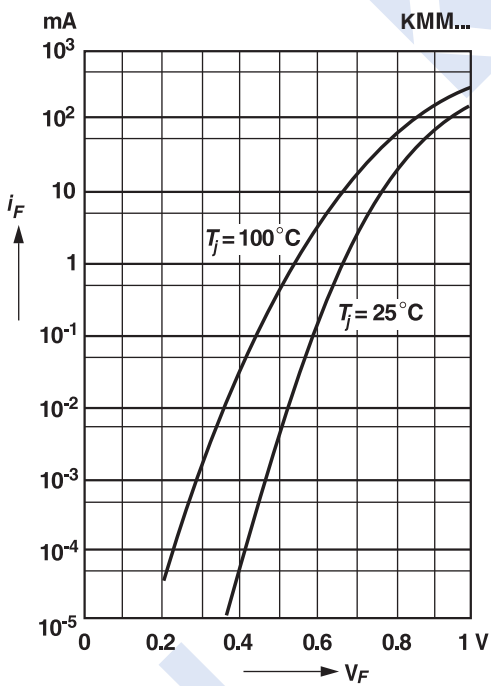
■ Typical Characteristics

**Breakdown characteristics**

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

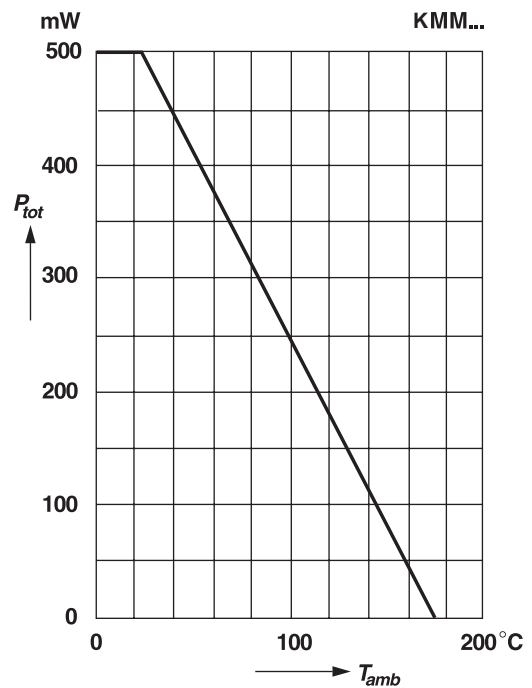


**Forward characteristics**



**Admissible power dissipation versus ambient temperature**

Valid provided that electrodes are kept at ambient temperature

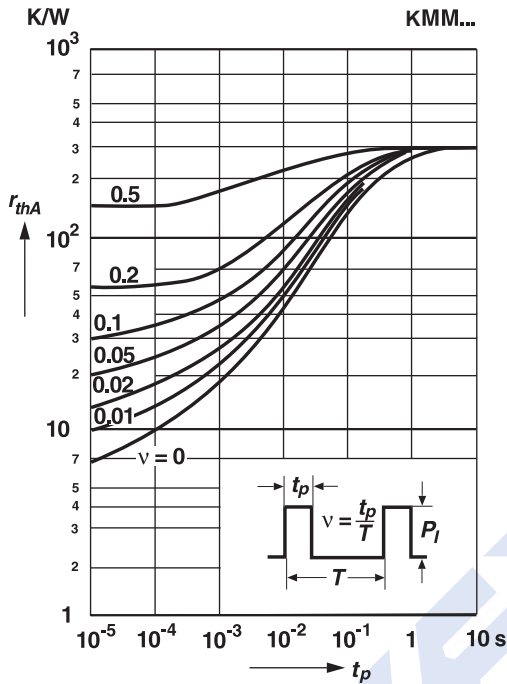


# KMM1B THRU KMM75B KMM1C THRU KMM75C

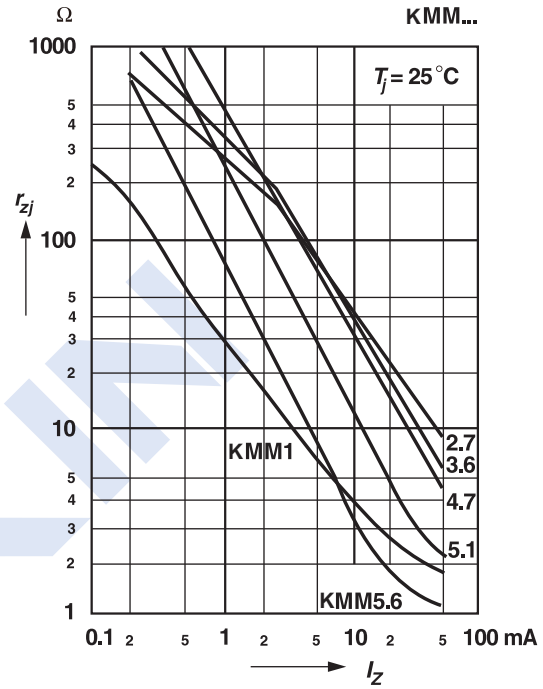
■ Typical Characteristics

**Pulse thermal resistance versus pulse duration**

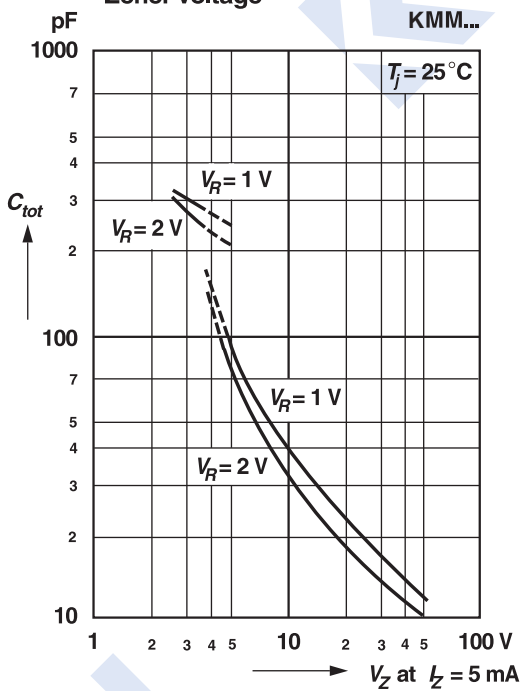
Valid provided that the electrodes are kept at ambient temperature



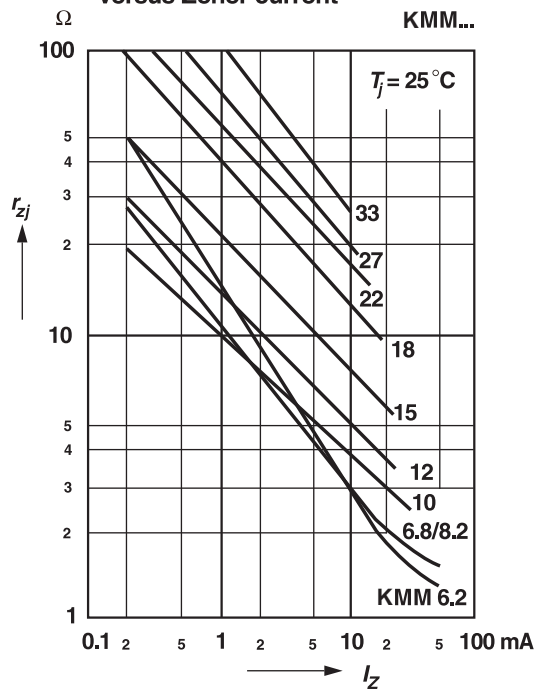
**Dynamic resistance versus Zener current**



**Capacitance versus Zener voltage**



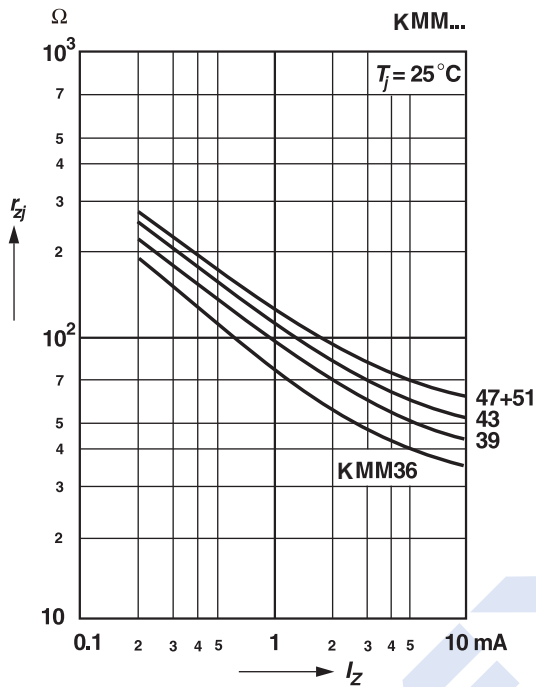
**Dynamic resistance versus Zener current**



# KMM1B THRU KMM75B KMM1C THRU KMM75C

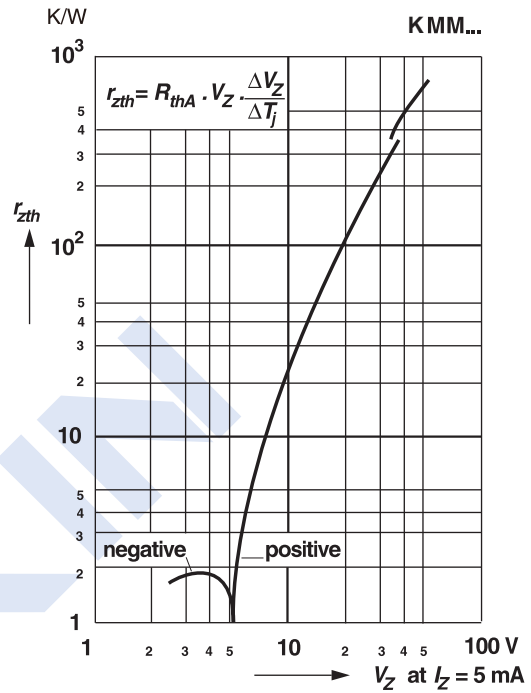
■ Typical Characteristics

Dynamic resistance versus Zener current

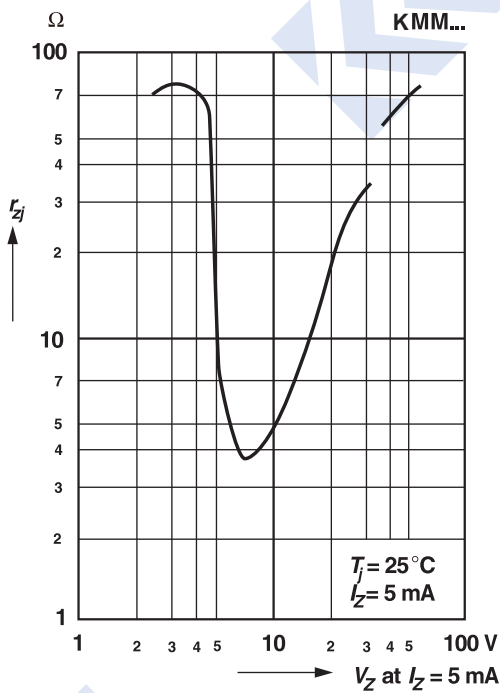


Thermal differential resistance versus Zener voltage

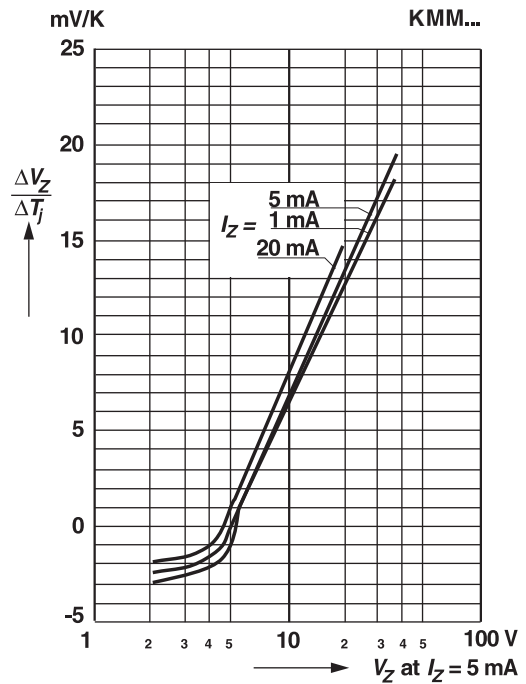
Valid provided that electrodes are kept at ambient temperature



Dynamic resistance versus Zener voltage



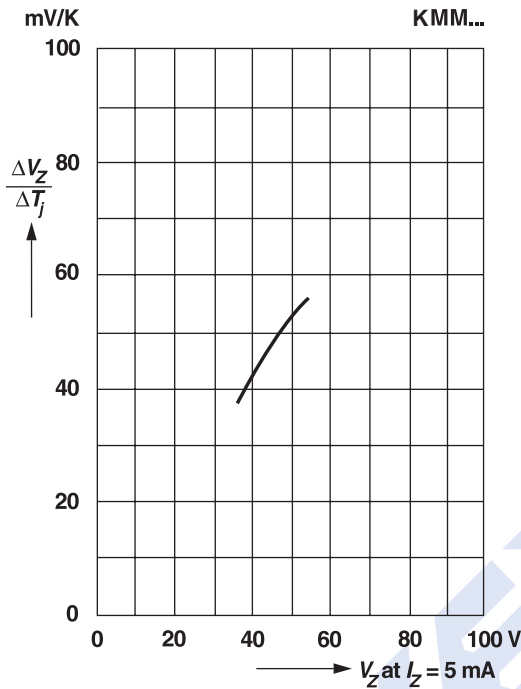
Temperature dependence of Zener voltage versus Zener voltage



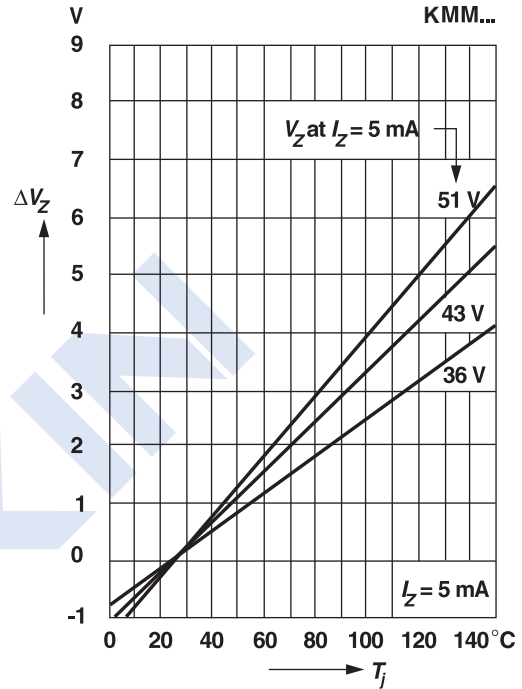
# KMM1B THRU KMM75B KMM1C THRU KMM75C

■ Typical Characteristics

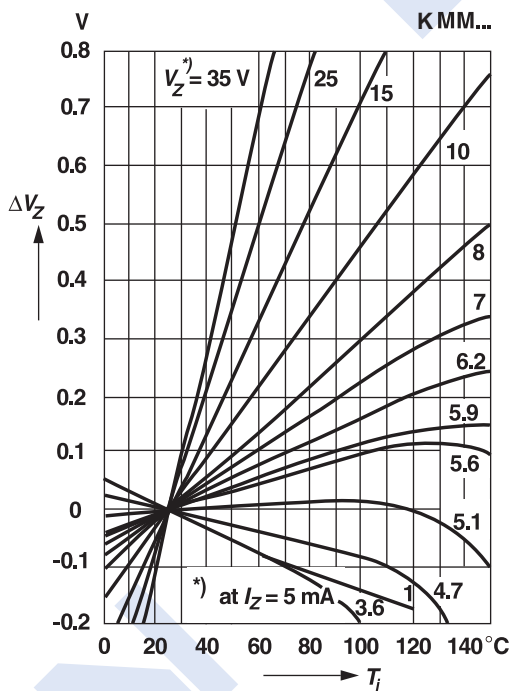
Temperature dependence of Zener voltage versus Zener voltage



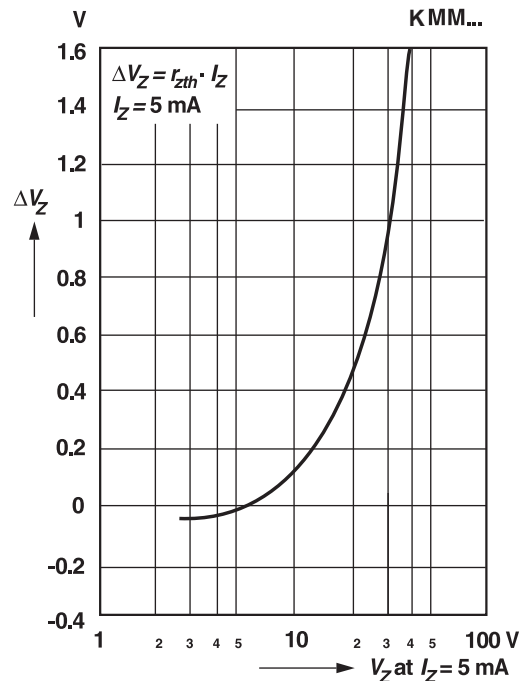
Change of Zener voltage versus junction temperature



Change of Zener voltage versus junction temperature



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





**KMM1B THRU KMM75B  
KMM1C THRU KMM75C**

## ■ Typical Characteristics

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

