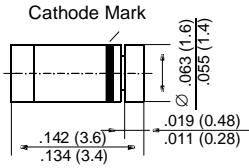


# ZMM1 THRU ZMM75

## ZENER DIODES

### Mini-MELF



Dimensions are in inches and (millimeters)

### FEATURES

- ♦ Silicon Planar Zener Diodes
- ♦ In Mini-MELF case especially for automatic insertion.
- ♦ The Zener voltages are graded according to the international E 24 standard. Smaller voltage tolerances and other Zener voltages are available upon request.
- ♦ These diodes are also available in DO-35 case with the type designation ZPD1 ... ZPD51.



### MECHANICAL DATA

**Case:** Mini-MELF Glass Case (SOD-80)

**Weight:** approx. 0.05 g

### MAXIMUM RATINGS

Ratings at 25°C ambient temperature unless otherwise specified.

	SYMBOL	VALUE	UNIT
Zener Current (see Table "Characteristics")			
Power Dissipation at $T_{amb} = 25^{\circ}\text{C}$	$P_{tot}$	500 <sup>(1)</sup>	mW
Junction Temperature	$T_j$	175	°C
Storage Temperature Range	$T_s$	- 55 to +175	°C

	SYMBOL	MIN.	TYP.	MAX.	UNIT
Thermal Resistance Junction to Ambient Air	$R_{thJA}$	—	—	0.3 <sup>(1)</sup>	°C/W

#### NOTES:

(1) Valid provided that electrodes are kept at ambient temperature.

# ZMM1 THRU ZMM75

## ELECTRICAL CHARACTERISTICS

Ratings at 25°C ambient temperature unless otherwise specified.

Type	Zener Voltage <sup>(1)</sup> at I <sub>Z</sub> = 5 mA  V <sub>Z</sub> V	Dynamic Resistance		Temp. Coeff. of Zener Voltage at I <sub>Z</sub> = 5 mA  $\alpha_{VZ}$ 10 <sup>-4</sup> /K	Reverse Voltage at I <sub>R</sub> = 100 nA  V <sub>R</sub> V	Admissible Zener current <sup>(2)</sup>	
		at I <sub>Z</sub> = 5 mA f = 1 kHz r <sub>ZJ</sub> Ω	at I <sub>Z</sub> = 1 mA f = 1 kHz r <sub>ZJ</sub> Ω			at T <sub>amb</sub> = 45°C  I <sub>Z</sub> = mA	at T <sub>amb</sub> = 25°C  I <sub>Z</sub> = mA
ZMM1 <sup>(3)</sup>	0.7 ... 0.8	6.5 (< 8)	< 50	- 26 ... - 23	-	280	340
ZMM2.7	2.5 ... 2.9	75 (< 83)	< 500	- 9 ... - 4	-	135	160
ZMM3	2.8 ... 3.2	80 (< 95)	< 500	- 9 ... - 3	-	117	140
ZMM3.3	3.1 ... 3.5	80 (< 95)	< 500	- 8 ... - 3	-	109	130
ZMM3.6	3.4 ... 3.8	80 (< 95)	< 500	- 8 ... - 3	-	101	120
ZMM3.9	3.7 ... 4.1	80 (< 95)	< 500	- 7 ... - 3	-	92	110
ZMM4.3	4.0 ... 4.6	80 (< 95)	< 500	- 6 ... - 1	-	85	100
ZMM4.7	4.4 ... 5.0	70 (< 78)	< 500	- 5 ... +2	-	76	90
ZMM5.1	4.8 ... 5.4	30 (< 60)	< 480	- 3 ... +4	> 0.8	67	80
ZMM5.6	5.2 ... 6.0	10 (< 40)	< 400	- 2 ... +6	> 1	59	70
ZMM6.2	5.8 ... 6.6	4.8 (< 10)	< 200	- 1 ... +7	> 2	54	64
ZMM6.8	6.4 ... 7.2	4.5 (< 8)	< 150	+2 ... +7	> 3	49	58
ZMM7.5	7.0 ... 7.9	4 (< 7)	< 50	+3 ... +7	> 5	44	53
ZMM8.2	7.7 ... 8.7	4.5 (< 7)	< 50	+4 ... +7	> 6	40	47
ZMM9.1	8.5 ... 9.6	4.8 (< 10)	< 50	+5 ... +8	> 7	36	43
ZMM10	9.4 ... 10.6	5.2 (< 15)	< 70	+5 ... +8	> 7.5	33	40
ZMM11	10.4 ... 11.6	6 (< 20)	< 70	+5 ... +9	> 8.5	30	36
ZMM12	11.4 ... 12.7	7 (< 20)	< 90	+6 ... +9	> 9	28	32
ZMM13	12.4 ... 14.1	9 (< 25)	< 110	+7 ... +9	> 10	25	29
ZMM15	13.8 ... 15.6	11 (< 30)	< 110	+7 ... +9	> 11	23	27
ZMM16	15.3 ... 17.1	13 (< 40)	< 170	+8 ... +9.5	> 12	20	24
ZMM18	16.8 ... 19.1	18 (< 50)	< 170	+8 ... +9.5	> 14	18	21
ZMM20	18.8 ... 21.2	20 (< 50)	< 220	+8 ... +10	> 15	17	20
ZMM22	20.8 ... 23.3	25 (< 55)	< 220	+8 ... +10	> 17	16	18
ZMM24	22.8 ... 25.6	28 (< 80)	< 220	+8 ... +10	> 18	13	16
ZMM27	25.1 ... 28.9	30 (< 80)	< 250	+8 ... +10	> 20	12	14
ZMM30	28 ... 32	35 (< 80)	< 250	+8 ... +10	> 22.5	10	13
ZMM33	31 ... 35	40 (< 80)	< 250	+8 ... +10	> 25	9	12
ZMM36	34 ... 38	40 (< 90)	< 250	+8 ... +10	> 27	9	11
ZMM39	37 ... 41	50 (< 90)	< 300	+10 ... +12	> 29	8	10
ZMM43	40 ... 46	60 (< 100)	< 700	+10 ... +12	> 32	7	9.2
ZMM47	44 ... 50	70 (< 100)	< 750	+10 ... +12	> 35	6	8.5
ZMM51	48 ... 54	70 (< 100)	< 750	+10 ... +12	> 38	6	7.8
ZMM56	52.0 ... 60.0 <sup>(4)</sup>	<135 <sup>(4)</sup>	<1000 <sup>(5)</sup>	typ. +10 <sup>(4)</sup>	-	-	-
ZMM62	58.0 ... 66.0 <sup>(4)</sup>	<150 <sup>(4)</sup>	<1000 <sup>(5)</sup>	typ. +10 <sup>(4)</sup>	-	-	-
ZMM68	64.0 ... 72.0 <sup>(4)</sup>	<200 <sup>(4)</sup>	<1000 <sup>(5)</sup>	typ. +10 <sup>(4)</sup>	-	-	-
ZMM75	70.0 ... 79.0 <sup>(4)</sup>	<250 <sup>(4)</sup>	<1500 <sup>(5)</sup>	typ. +10 <sup>(4)</sup>	-	-	-

### NOTES:

(1) Tested with pulses t<sub>p</sub> = 5 ms

(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

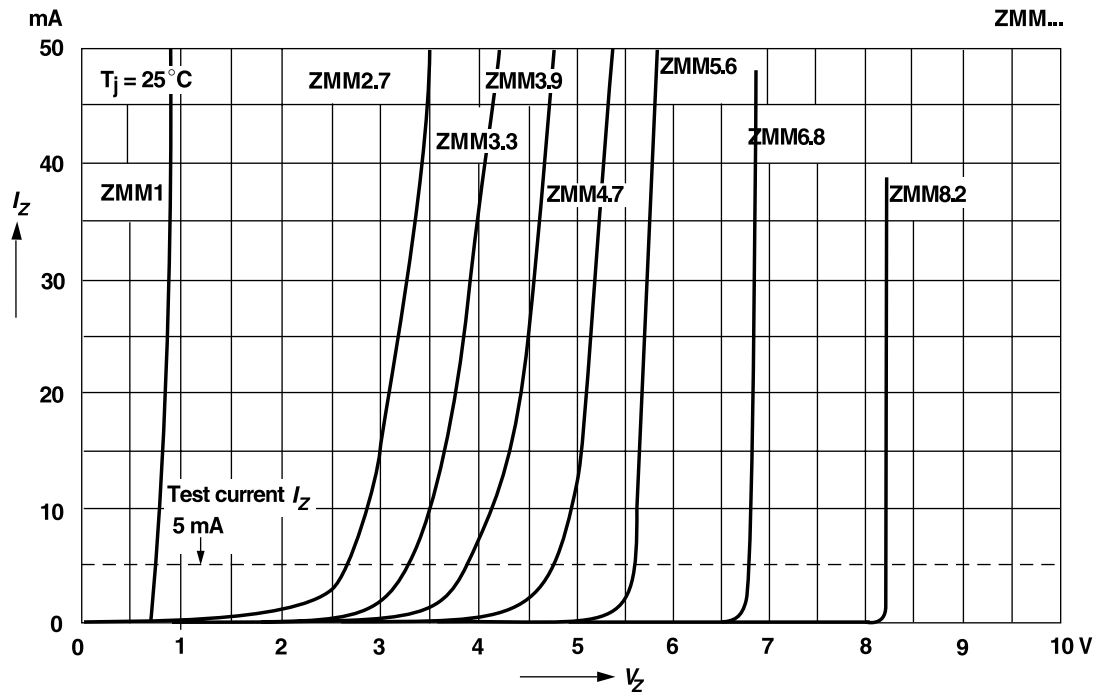
(4) at I<sub>Z</sub> = 2.5 mA

(5) at I<sub>Z</sub> = 0.5 mA

# RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

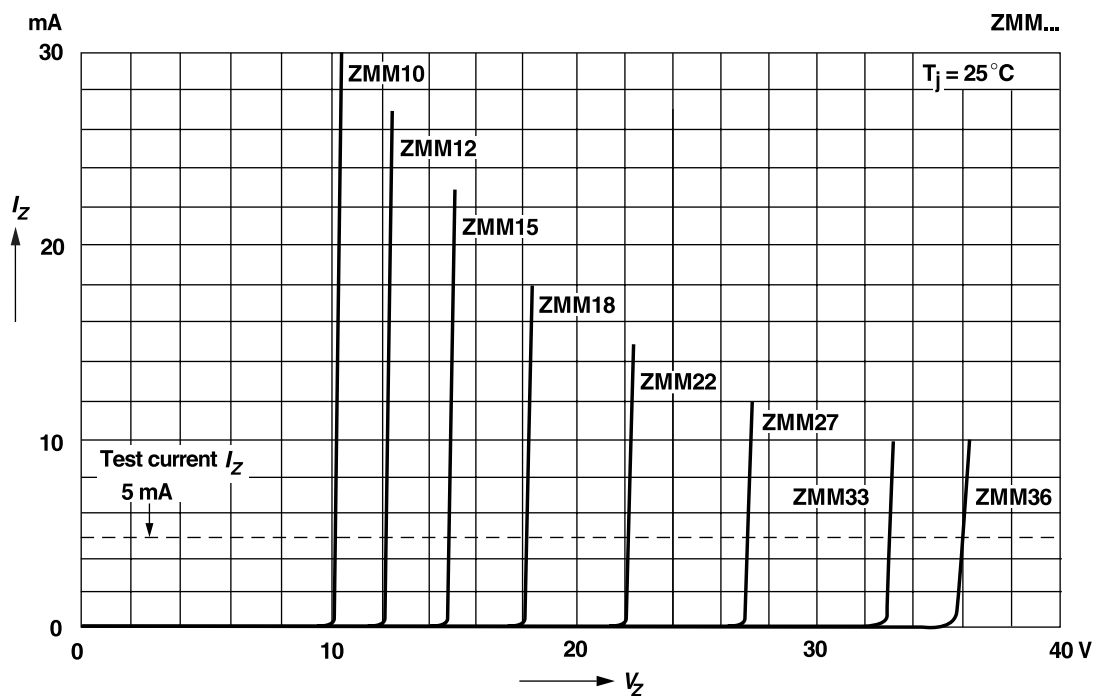
## Breakdown characteristics

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



## Breakdown characteristics

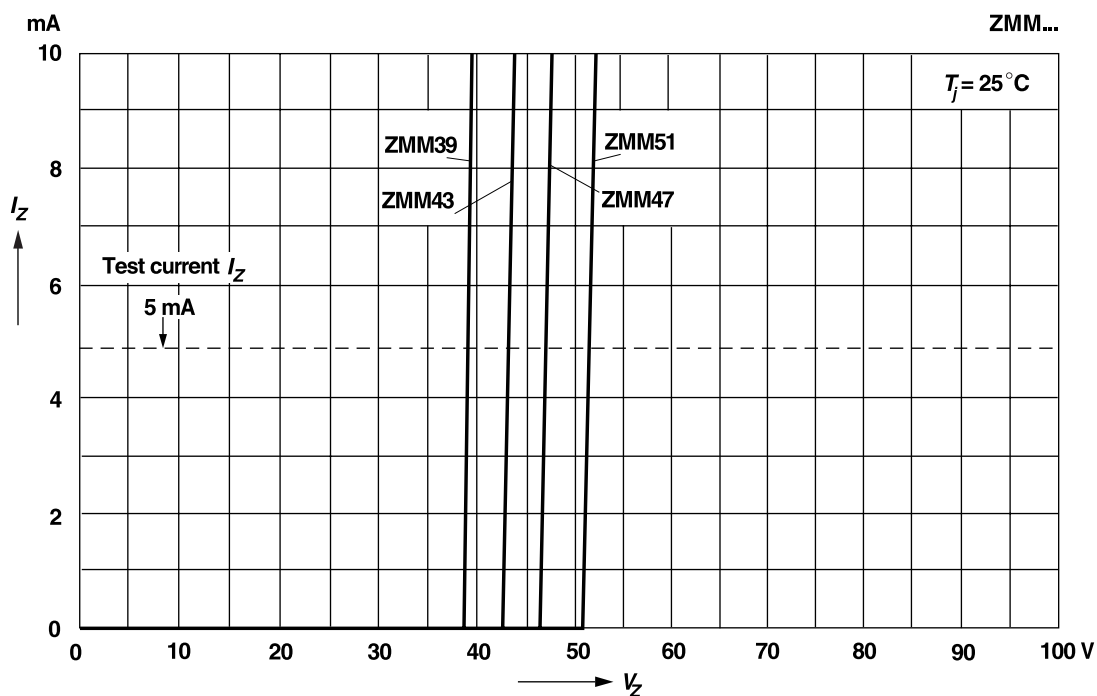
$T_j = \text{constant (pulsed)}$



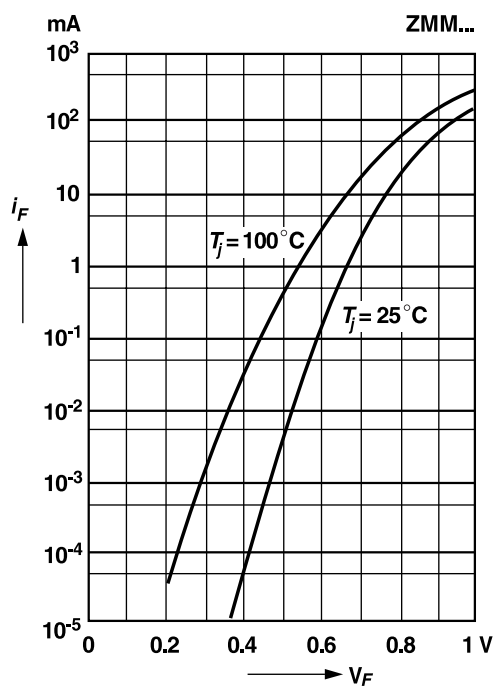
# RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

## Breakdown characteristics

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

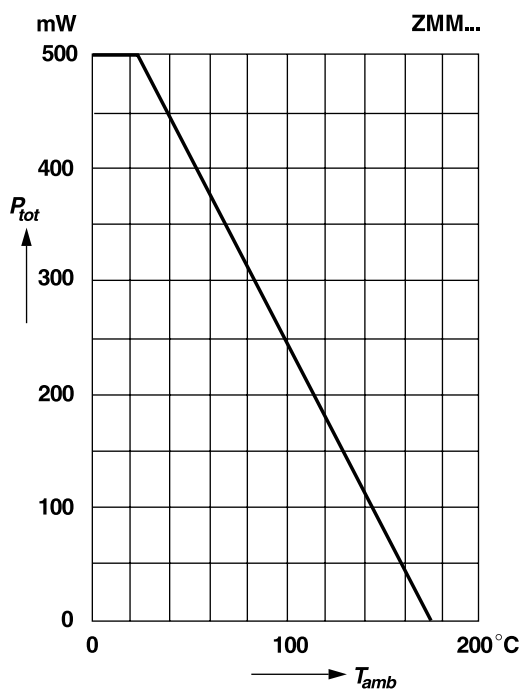


## Forward characteristics



## Admissible power dissipation versus ambient temperature

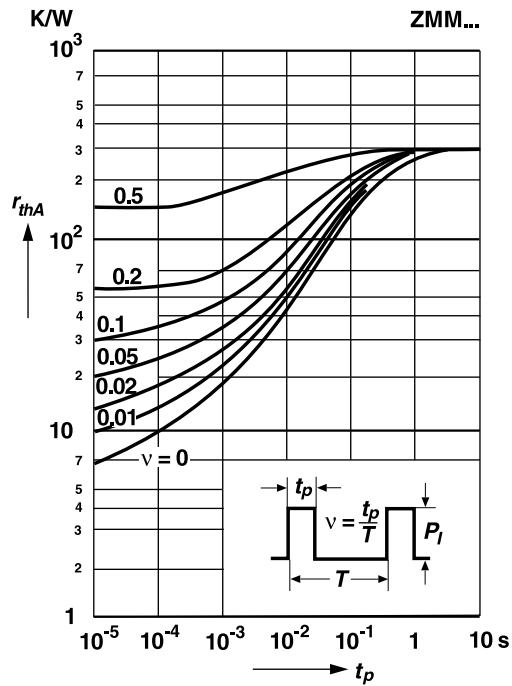
Valid provided that electrodes are kept at ambient temperature



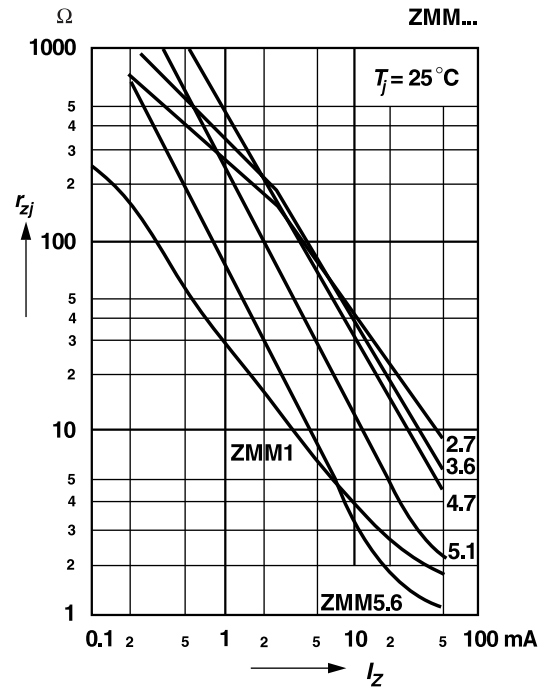
# RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

## Pulse thermal resistance versus pulse duration

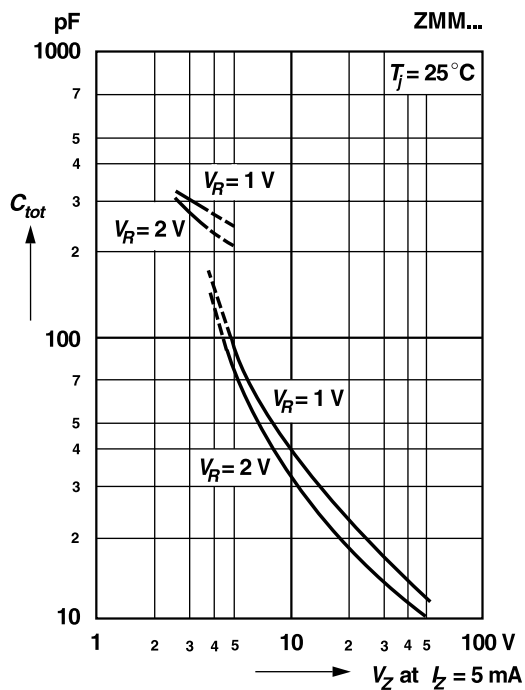
Valid provided that the electrodes are kept  
at ambient temperature



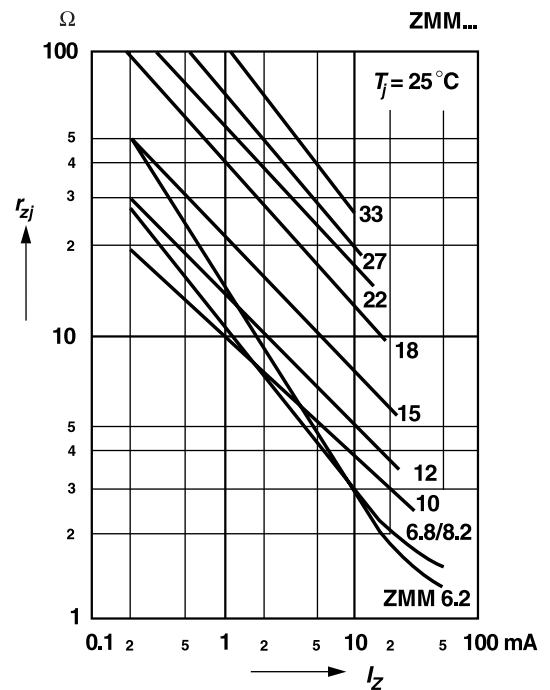
## Dynamic resistance versus Zener current



## Capacitance versus Zener voltage

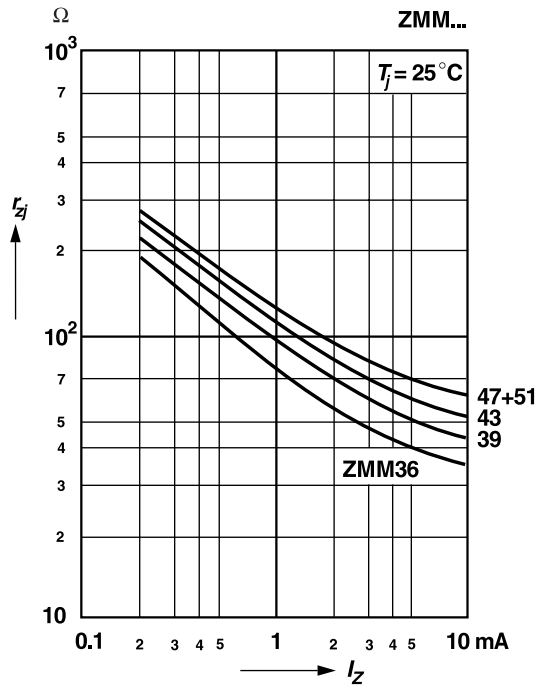


## Dynamic resistance versus Zener current



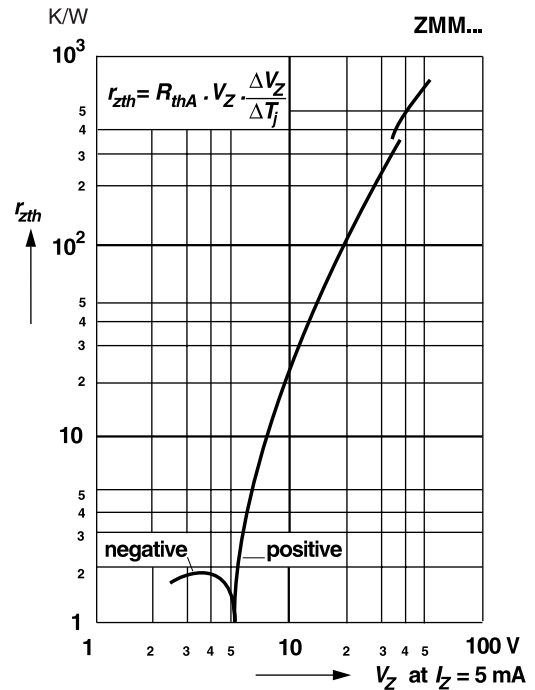
# RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

**Dynamic resistance  
versus Zener current**

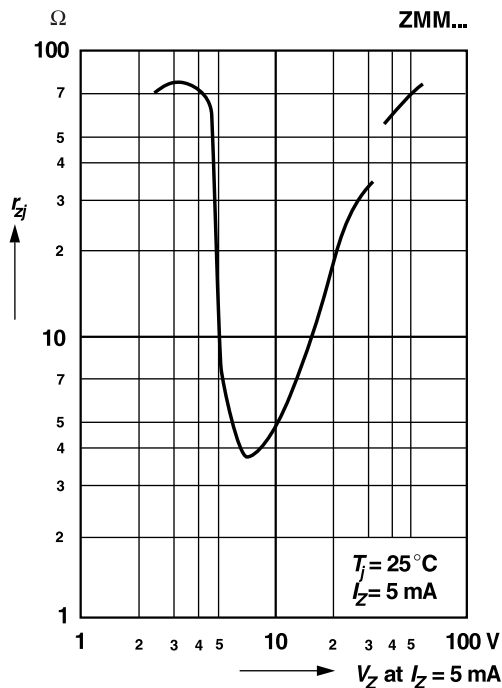


**Thermal differential resistance  
versus Zener voltage**

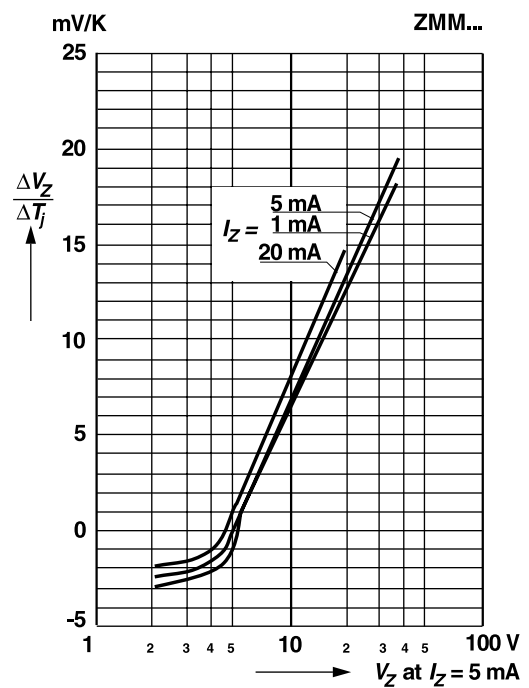
Valid provided that electrodes are kept  
at ambient temperature



**Dynamic resistance  
versus Zener voltage**

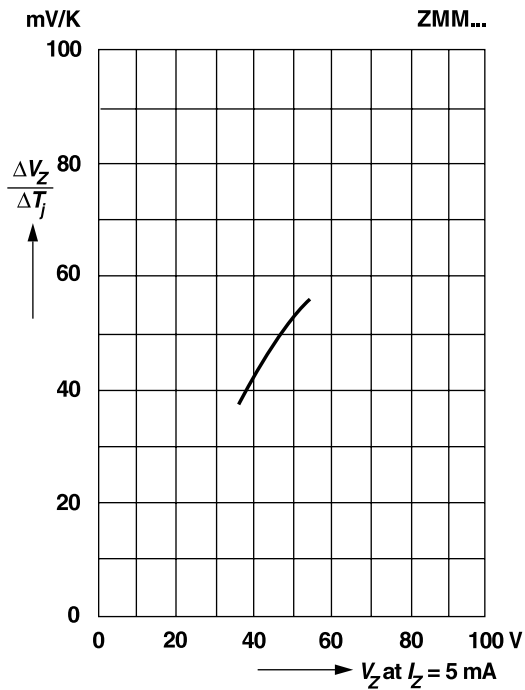


**Temperature dependence of Zener voltage  
versus Zener voltage**

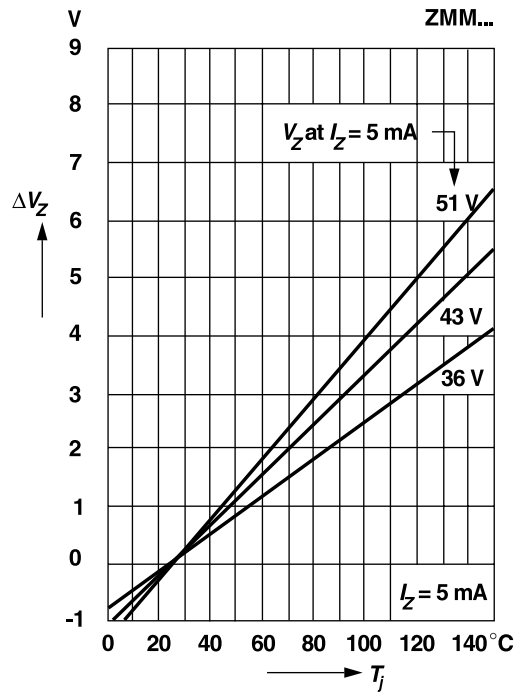


# RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

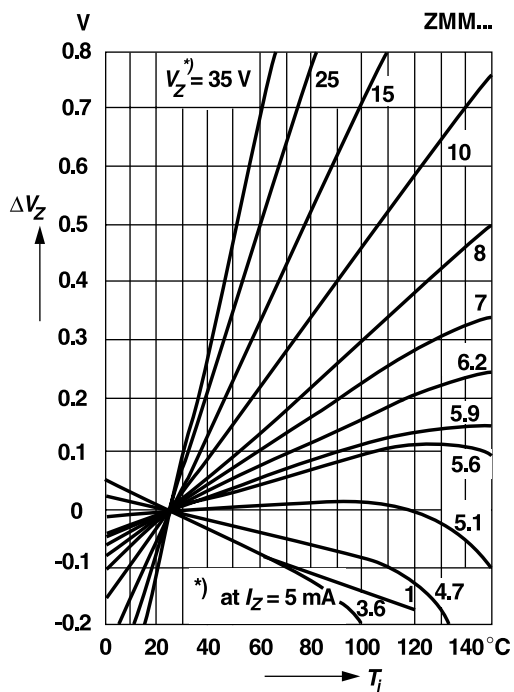
Temperature dependence of Zener voltage versus Zener voltage



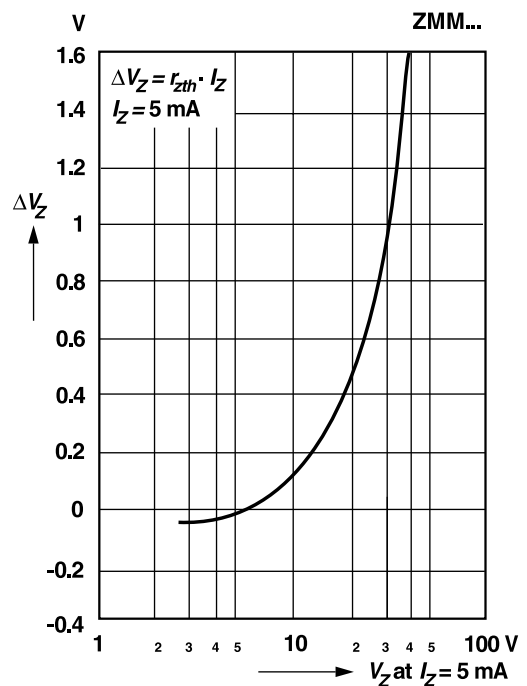
Change of Zener voltage versus junction temperature



Change of Zener voltage versus junction temperature



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



## RATINGS AND CHARACTERISTIC CURVES ZMM1 THRU ZMM75

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

