



# ZMM1 THRU ZMM200

## SILICON PLANAR ZENER DIODES

### Features

#### Silicon Planar Zener Diodes

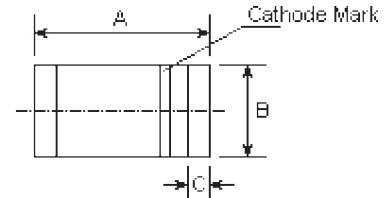
in MiniMELF case especially for automatic insertion. The Zener voltages are graded according to the international E 24 standard. Smaller voltage tolerances and higher Zener voltages on request.

These diodes are also available in DO-35 case with the type designation ZPD1 thru ZPD51.

These diodes are delivered taped.  
Details see "Taping".

Weight approx. : 0.05g

### MiniMELF



DIMENSIONS					
DIM	inches		mm		Note
	Min.	Max.	Min.	Max.	
A	0.134	0.142	3.4	3.6	
B	0.055	0.059	1.40	1.50	φ
C	0.008	0.016	0.2	0.4	

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

	Symbols	Values	Units
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	$^\circ\text{C}$
Storage temperature range	$T_s$	-55 to +175	$^\circ\text{C}$

Note:

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

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

	Symbols	Min.	Typ.	Max.	Units
Thermal resistance junction to ambient Air	$R_{thA}$	-	-	0.3 <sup>(1)</sup>	K/mW

Note:

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

Type	Zener voltage range <sup>1)</sup>			Dynamic resistance			Reverse leakage current			Temp. coefficient of Zener Voltage TK <sub>Vz</sub> %/K
	V <sub>znom</sub>	I <sub>ZT</sub> for V <sub>ZT</sub> <sup>2)</sup>		r <sub>ZT</sub> and r <sub>ZJK</sub> at I <sub>ZK</sub>			I <sub>R</sub> and I <sub>R</sub> <sup>2)</sup> at V <sub>R</sub>			
		V	mA	V	Ω	Ω	mA	μA	μA	
ZMM1 <sup>3)</sup>	0.75	5	0.7 ... 0.8	<8	<50	1	-	-	-	-0.26 ... -0.23
ZMM2.0	2.0	5	1.9 ... 2.1	<85	<600	1	<100	<200	1	-0.09 ... -0.06
ZMM2.4	2.4	5	2.28 ... 2.56	<85	<600	1	<50	<100	1	-0.09 ... -0.06
ZMM2.7	2.7	5	2.5 ... 2.9	<85	<600	1	<10	<50	1	-0.09 ... -0.06
ZMM3.0	3.0	5	2.8 ... 3.2	<85	<600	1	<4	<40	1	-0.08 ... -0.05
ZMM3.3	3.3	5	3.1 ... 3.5	<85	<600	1	<2	<40	1	-0.08 ... -0.05
ZMM3.6	3.6	5	3.4 ... 3.8	<85	<600	1	<2	<40	1	-0.08 ... -0.05
ZMM3.9	3.9	5	3.7 ... 4.1	<85	<600	1	<2	<40	1	-0.08 ... -0.05
ZMM4.3	4.3	5	4.0 ... 4.6	<75	<600	1	<1	<20	1	-0.06 ... -0.03
ZMM4.7	4.7	5	4.4 ... 5.0	<60	<600	1	<0.5	<10	1	-0.05 ... +0.02
ZMM5.1	5.1	5	4.8 ... 5.4	<35	<550	1	<0.1	<2	1	-0.02 ... +0.02
ZMM5.6	5.6	5	5.2 ... 6.0	<25	<450	1	<0.1	<2	1	-0.05 ... +0.05
ZMM6.2	6.2	5	5.8 ... 6.6	<10	<200	1	<0.1	<2	2	0.03 ... 0.06
ZMM6.8	6.8	5	6.4 ... 7.2	<8	<150	1	<0.1	<2	3	0.03 ... 0.07
ZMM7.5	7.5	5	7.0 ... 7.9	<7	<50	1	<0.1	<2	5	0.03 ... 0.07
ZMM8.2	8.2	5	7.7 ... 8.7	<7	<50	1	<0.1	<2	6.2	0.03 ... 0.08
ZMM9.1	9.1	5	8.5 ... 9.6	<10	<50	1	<0.1	<2	6.8	0.03 ... 0.09
ZMM10	10	5	9.4 ... 10.6	<15	<70	1	<0.1	<2	7.5	0.03 ... 0.1
ZMM11	11	5	10.4 ... 11.6	<20	<70	1	<0.1	<2	8.2	0.03 ... 0.11
ZMM12	12	5	11.4 ... 12.7	<20	<90	1	<0.1	<2	9.1	0.03 ... 0.11
ZMM13	13	5	12.4 ... 14.1	<26	<110	1	<0.1	<2	10	0.03 ... 0.11
ZMM15	15	5	13.8 ... 15.6	<30	<110	1	<0.1	<2	11	0.03 ... 0.11
ZMM16	16	5	15.3 ... 17.1	<40	<170	1	<0.1	<2	12	0.03 ... 0.11
ZMM18	18	5	16.8 ... 19.1	<50	<170	1	<0.1	<2	13	0.03 ... 0.11
ZMM20	20	5	18.8 ... 21.2	<55	<220	1	<0.1	<2	15	0.03 ... 0.11
ZMM22	22	5	20.8 ... 23.3	<55	<220	1	<0.1	<2	16	0.04 ... 0.12
ZMM24	24	5	22.8 ... 25.6	<80	<220	1	<0.1	<2	18	0.04 ... 0.12
ZMM27	27	5	25.1 ... 28.9	<80	<220	1	<0.1	<2	20	0.04 ... 0.12
ZMM30	30	5	28 ... 32	<80	<220	1	<0.1	<2	22	0.04 ... 0.12
ZMM33	33	5	31 ... 35	<80	<220	1	<0.1	<2	24	0.04 ... 0.12
ZMM36	36	5	34 ... 38	<80	<220	1	<0.1	<2	27	0.04 ... 0.12
ZMM39	39	2.5	37 ... 41	<90	<500	0.5	<0.1	<5	30	0.04 ... 0.12
ZMM43	43	2.5	40 ... 46	<90	<500	0.5	<0.1	<5	33	0.04 ... 0.12
ZMM47	47	2.5	44 ... 50	<110	<600	0.5	<0.1	<5	36	0.04 ... 0.12
ZMM51	51	2.5	48 ... 54	<125	<700	0.5	<0.1	<10	39	0.04 ... 0.12
ZMM56	56	2.5	52 ... 60	<135	<700	0.5	<0.1	<10	43	0.04 ... 0.12
ZMM62	62	2.5	58 ... 66	<150	<1000	0.5	<0.1	<10	47	0.04 ... 0.12
ZMM68	68	2.5	64 ... 72	<200	<1000	0.5	<0.1	<10	51	0.04 ... 0.12
ZMM75	75	2.5	70 ... 79	<250	<1000	0.5	<0.1	<10	56	0.04 ... 0.12
ZMM82	82	2.5	77 ... 87	<300	<1500	0.25	<0.1	<10	62	0.05 ... 0.12
ZMM91	91	1	85 ... 96	<450	<2000	0.1	<0.1	<10	68	0.05 ... 0.12
ZMM100	100	1	94 ... 106	<450	<5000	0.1	<0.1	<10	75	0.05 ... 0.12
ZMM110	110	1	104 ... 116	<600	<5000	0.1	<0.1	<10	82	0.05 ... 0.12
ZMM120	120	1	114 ... 127	<800	<5500	0.1	<0.1	<10	91	0.05 ... 0.12
ZMM130	130	1	124 ... 141	<950	<6000	0.1	<0.1	<10	100	0.05 ... 0.12
ZMM150	150	1	138 ... 156	<1250	<6500	0.1	<0.1	<10	110	0.05 ... 0.12
ZMM160	160	1	153 ... 171	<1400	<7000	0.1	<0.1	<10	120	0.05 ... 0.12
ZMM180	180	1	168 ... 191	<1700	<8500	0.1	<0.1	<10	130	0.05 ... 0.12
ZMM200	200	1	188 ... 212	<2000	<10000	0.1	<0.1	<10	150	0.05 ... 0.12

Notes:

(1) Tested with pulses tp=20ms.

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

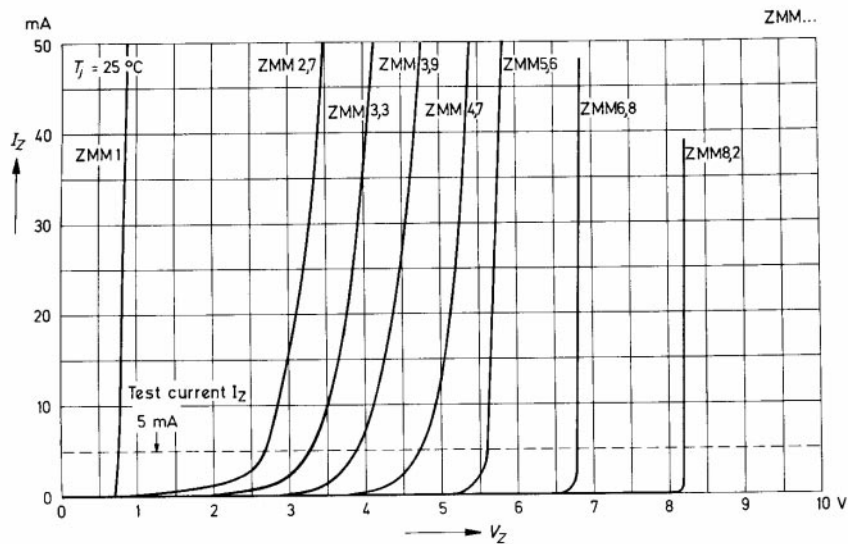
(3) The ZMM1 is a silicon diode with operation in forward direction. Hence, the index of all parameters should be "F" instead of "Z".

Connect the cathode electrode to the negative pole.

# RATINGS AND CHARACTERISTIC CURVES

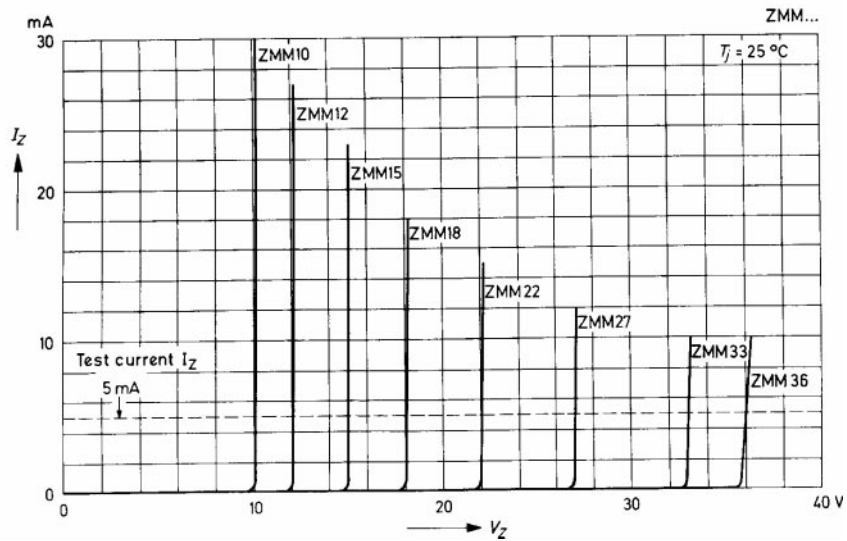
## Breakdown characteristics

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



## Breakdown characteristics

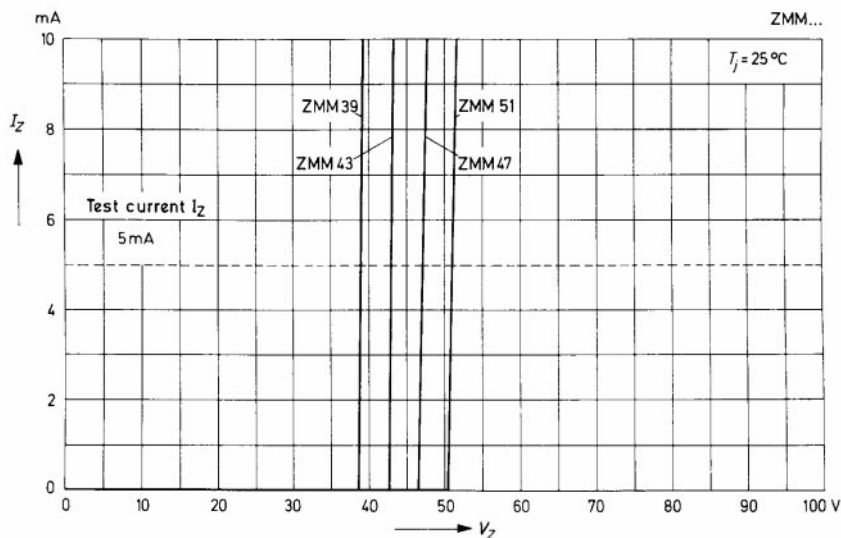
$T_j = \text{constant}$  (pulsed)



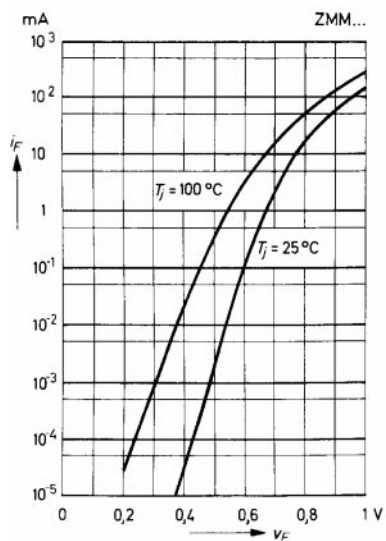
# RATINGS AND CHARACTERISTIC CURVES

## Breakdown characteristics

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

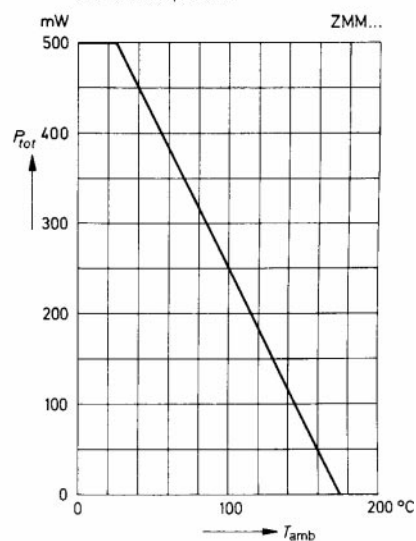


## Forward characteristics



## Admissible power dissipation versus ambient temperature

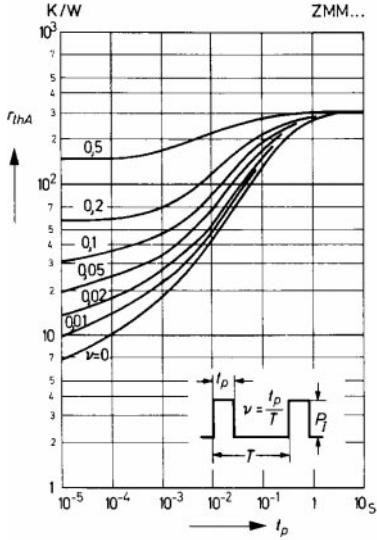
Valid provided that electrodes are kept at ambient temperature.



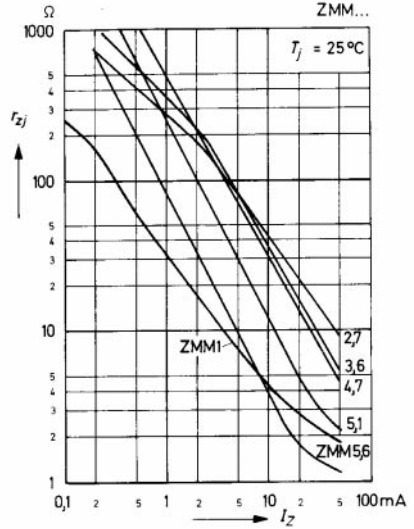
# RATINGS AND CHARACTERISTIC CURVES

## Pulse thermal resistance versus pulse duration

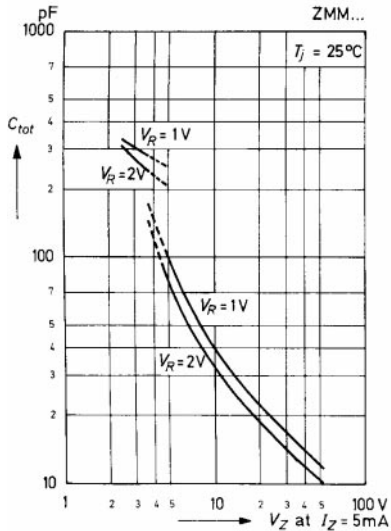
Valid provided that the electrodes are kept at ambient temperature.



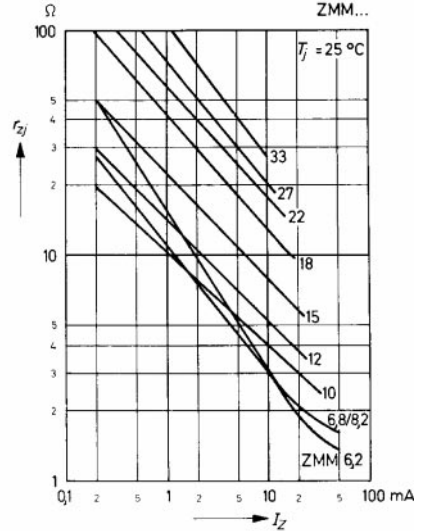
## Dynamic resistance versus Zener current



## Capacitance versus Zener voltage

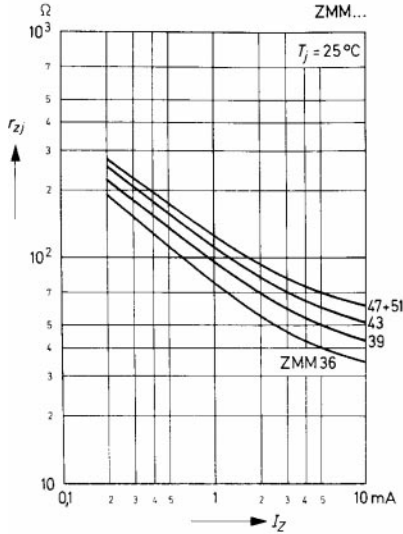


## Dynamic resistance versus Zener current



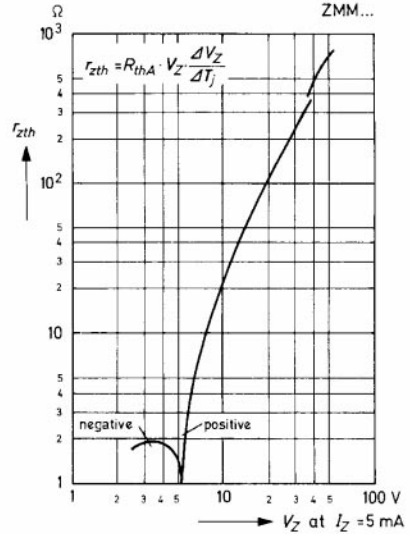
# RATINGS AND CHARACTERISTIC CURVES

**Dynamic resistance versus Zener current**

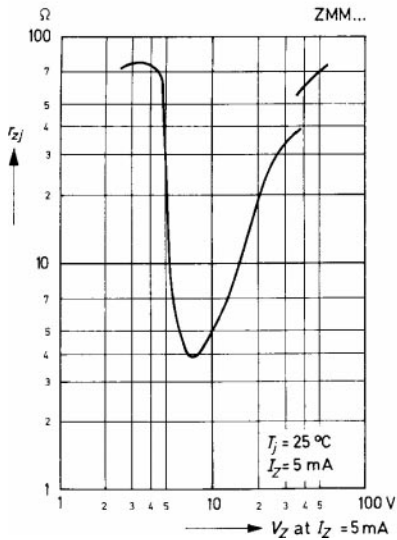


**Thermal differential resistance versus Zener voltage**

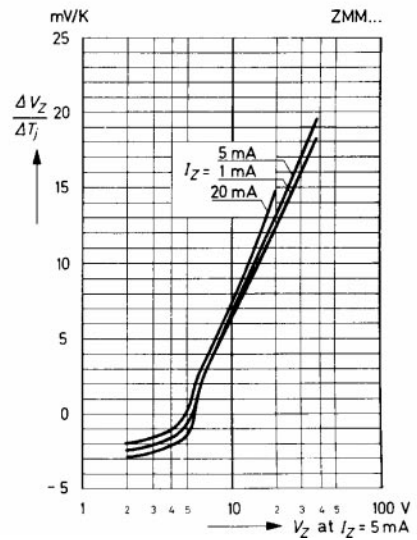
Valid provided that electrodes are kept at ambient temperature.



**Dynamic resistance versus Zener voltage**

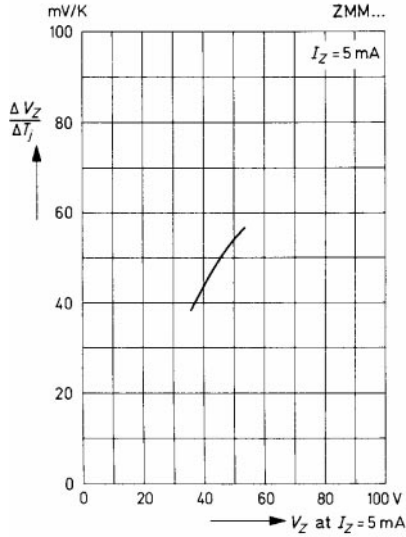


**Temperature dependence of Zener voltage versus Zener voltage**

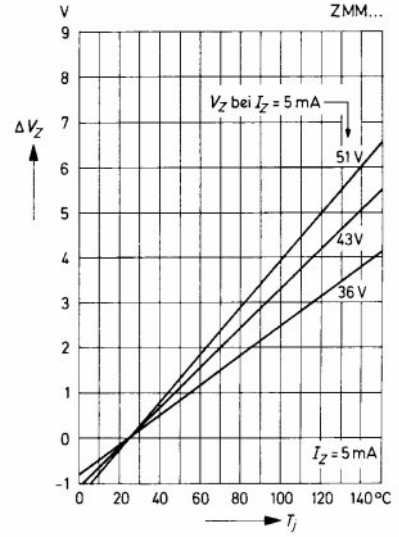


# RATINGS AND CHARACTERISTIC CURVES

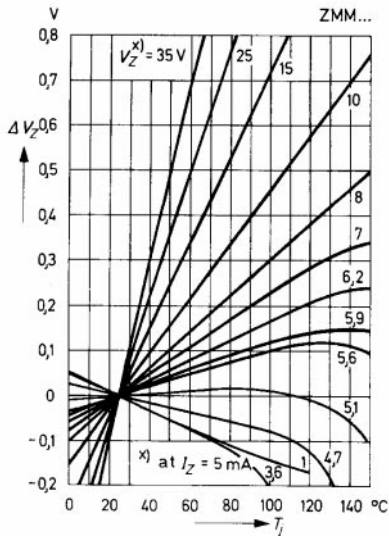
Temperature dependence of Zener voltage versus Zener voltage



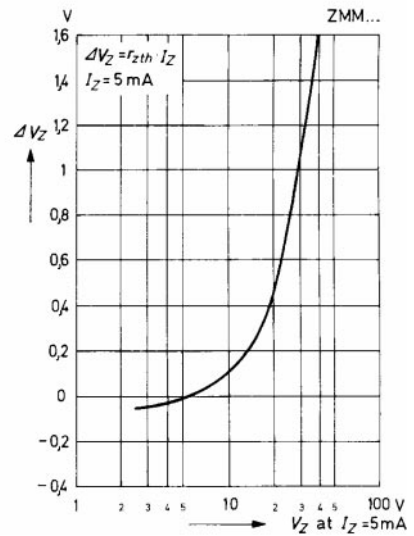
Change of Zener voltage versus junction temperature



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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## RATINGS AND CHARACTERISTIC CURVES

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

