# RUILON
## 瑞隆源电子

# ZMM1 THRU ZMM200
## 0.5W SILICON PLANAR ZENER DIODES

## FEATURES

- In MinMELF case especially for automated insertion
  Standard Zener voltage tolerance is 5%.Add suffix "B" for 2% tolerance
  Other tolerance, non standard and higher zener voltages are upon
  request
- High temperature soldering guaranteed:260℃/10 seconds at terminals
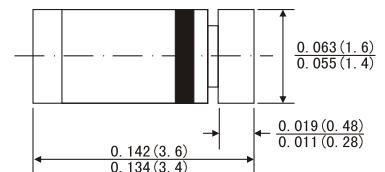
## MECHANICAL DATA

- *Case*: MiniMELF(SOD-80) glass case
- *Weight*: Approx. 0.05 gram

### MiniMELF



0.063 (1.6)
0.055 (1.4)

0.019 (0.48)
0.011 (0.28)

0.142 (3.6)
0.134 (3.4)

Dimensions in inches and (millimeters)

## ABSOLUTE MAXIMUM RATINGS(LIMITING VALUES) (TA=25℃)

| | Symbols | Value | Units |
|---|---|---|---|
| Zener current see table "Characteristics" | | | |
| Power dissipation at TA=25℃ | $P_{tot}$ | 500[1] | mW |
| Junction temperature | $T_J$ | 175 | ℃ |
| Storage temperature range | $T_{STG}$ | -55 to+175 | ℃ |

## ELECTRICAL CHARACTERISTICS (TA=25℃)

| | Symbols | Min | Typ | Max | Units |
|---|---|---|---|---|---|
| Thermal resistance junction to ambient | $R_{θJA}$ | | | 300[1] | K/W |
| Forward Voltage at $I_F$ = 100mA | $V_F$ | | | 1 | V |

1) Valid provided that electrodes case is kept at ambient temperature

| Type | Zener Voltage range [1] | | | Maximum zener impedance [1] | | | Maximum Reverse Leakage Current | | | Temp Coefficient of zener voltage |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| | $V_{ZNOM}$ [3] | $I_{ZT}$ | | $r_{Zjt}$ and $r_{ZjK}$ at $I_{ZK}$ | | | $I_R$ and $I_R$ [2] at $V_R$ | | | $TK_{VZ}$ |
| | V | mA | V | Ω | Ω | mA | μA | μA | V | %/K |
| ZMM1 [3] | 0.75 | | 0.7...0.8 | <8 | <50 | | -- | -- | | -0.26...-0.23 |
| ZMM2.0 | 2 | | 1.9...2.1 | <85 | <600 | | <100 | <200 | | -0.09...-0.06 |
| ZMM2.4 | 2.4 | | 2.28...2.56 | <85 | <600 | | <50 | <100 | | -0.09...-0.06 |
| ZMM2.7 | 2.7 | | 2.5...2.9 | <85 | <600 | | <10 | <50 | | -0.09...-0.06 |
| ZMM3.0 | 3 | | 2.8...3.2 | <85 | <600 | | <4 | <40 | | -0.08...-0.05 |
| ZMM3.3 | 3.3 | | 3.1...3.5 | <85 | <600 | | <2 | <40 | 1.0 | -0.08...-0.05 |
| ZMM3.6 | 3.6 | | 3.4...3.8 | <85 | <600 | | <2 | <40 | | -0.08...-0.05 |
| ZMM3.9 | 3.9 | | 3.7...4.1 | <85 | <600 | | <2 | <40 | | -0.08...-0.05 |
| ZMM4.3 | 4.3 | | 4.0...4.6 | <75 | <600 | | <1 | <20 | | -0.06...-0.03 |
| ZMM4.7 | 4.7 | | 4.4...5.0 | <60 | <600 | | <0.5 | <10 | | -0.05...+0.02 |
| ZMM5.1 | 5.1 | | 4.8...5.4 | <35 | <550 | | | | | -0.02...+0.02 |
| ZMM5.6 | 5.6 | | 5.2...6.0 | <25 | <450 | | | | | -0.05...+0.05 |
| ZMM6.2 | 6.2 | | 5.8...6.6 | <10 | <200 | | | | 2 | 0.03...0.06 |
| ZMM6.8 | 6.8 | 5 | 6.4...7.2 | <8 | <150 | | | <2 | 3 | 0.03...0.07 |
| ZMM7.5 | 7.5 | | 7.0...7.9 | <7 | <50 | 1 | | | 5 | 0.03...0.08 |
| ZMM8.2 | 8.2 | | 7.7...8.7 | <7 | <50 | | | | 6.2 | 0.03...0.09 |
| ZMM9.1 | 9.1 | | 8.5...9.6 | <10 | <50 | | | | 6.8 | 0.03...0.1 |
| ZMM10 | 10 | | 9.4...10.6 | <15 | <70 | | | | 7.5 | 0.03...0.11 |
| ZMM11 | 11 | | 10.4...11.6 | <20 | <70 | | | | 8.2 | 0.03...0.11 |
| ZMM12 | 12 | | 11.4...12.7 | <20 | <90 | | | | 9.1 | 0.03...0.11 |
| ZMM13 | 13 | | 12.4...14.1 | <26 | <110 | | | | 10 | 0.03...0.11 |
| ZMM15 | 20 | | 13.8...15.6 | <30 | <110 | | | | 11 | 0.03...0.11 |
| ZMM16 | 15 | | 15.3...17.1 | <40 | <170 | | | | 12 | 0.03...0.11 |
| ZMM18 | 22 | | 16.8...19.1 | <50 | <170 | | | | 13 | 0.03...0.11 |
| ZMM20 | 16 | | 18.8...21.2 | <55 | <220 | | | | 15 | 0.03...0.11 |
| ZMM22 | 24 | | 20.8...23.3 | <55 | <220 | | | | 16 | 0.04...0.12 |
| ZMM24 | 27 | | 22.8...25.6 | <80 | <220 | | | | 18 | 0.04...0.12 |
| ZMM27 | 18 | | 25.1...28.9 | <80 | <220 | | | | 20 | 0.04...0.12 |
| ZMM30 | 30 | | 28...32 | <80 | <220 | | | | 22 | 0.04...0.12 |
| ZMM33 | 33 | | 31...35 | <80 | <220 | | | | 24 | 0.04...0.12 |
| ZMM36 | 36 | | 34...38 | <80 | <220 | | | | 27 | 0.04...0.12 |
| ZMM39 | 39 | | 37...41 | <90 | <500 | | | | 30 | 0.04...0.12 |
| ZMM43 | 43 | | 40...46 | <90 | <500 | | 0.1 | <5 | 33 | 0.04...0.12 |
| ZMM47 | 47 | | 44...50 | <110 | <600 | | | | 36 | 0.04...0.12 |
| ZMM51 | 51 | | 48...54 | <125 | <700 | | | | 39 | 0.04...0.12 |
| ZMM56 | 56 | 2.5 | 52...60 | <135 | <700 | 0.25 | | | 43 | 0.04...0.12 |
| ZMM62 | 62 | | 58...66 | <150 | <1000 | | | | 47 | 0.04...0.12 |
| ZMM68 | 68 | | 64...72 | <200 | <1000 | | | | 51 | 0.04...0.12 |
| ZMM75 | 75 | | 70...79 | <250 | <1000 | | | | 56 | 0.04...0.12 |
| ZMM82 | 82 | | 77...87 | <300 | <1500 | | | | 62 | 0.05...0.12 |
| ZMM91 | 91 | | 85...96 | <450 | <2000 | | | | 68 | 0.05...0.12 |
| ZMM100 | 100 | | 94...106 | <450 | <5000 | | | | 75 | 0.05...0.12 |
| ZMM110 | 110 | | 104...116 | <600 | <5000 | | | <10 | 82 | 0.05...0.12 |
| ZMM120 | 120 | | 114...127 | <800 | <5500 | | | | 91 | 0.05...0.12 |
| ZMM130 | 130 | 1 | 124...141 | <950 | <6000 | 0.1 | | | 100 | 0.05...0.12 |
| ZMM150 | 150 | | 138...156 | <1250 | <6500 | | | | 110 | 0.05...0.12 |
| ZMM160 | 160 | | 153...171 | <1400 | <7000 | | | | 120 | 0.05...0.12 |
| ZMM180 | 180 | | 168...191 | <1700 | <8500 | | | | 130 | 0.05...0.12 |
| ZMM200 | 200 | | 188...212 | <2000 | <10000 | | | | 150 | 0.05...0.12 |

1) Tested with pulse 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 to the negative pole.

## BREAKDOWN CHARACTERISTICS AT $T_J$= CONSTANT (PULSED)
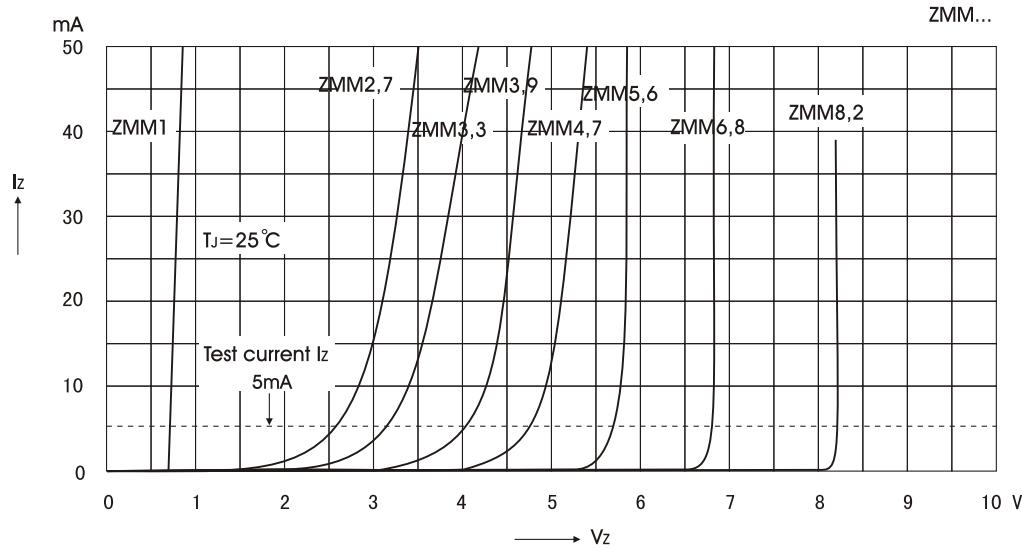


ZMM...

ZMM1, ZMM2,7, ZMM3,3, ZMM3,9, ZMM4,7, ZMM5,6, ZMM6,8, ZMM8,2

$T_J = 25°C$

Test current Iz 5mA

## BREAKDOWN CHARACTERISTICS AT $T_J$= CONSTANT (PULSED)



ZMM...

$T_J = 25°C$

ZMM10, ZMM12, ZMM15, ZMM18, ZMM22, ZMM27, ZMM33, ZMM36

Test current Iz 5mA

## BREAKDOWN CHARACTERISTICS AT $T_J$= CONSTANT (PULSED)

ZMM...

mA

$I_z$

ZMM39  ZMM51

Test current Iz
5mA

ZMM43  ZMM47

$T_J$=25℃

$V_z$
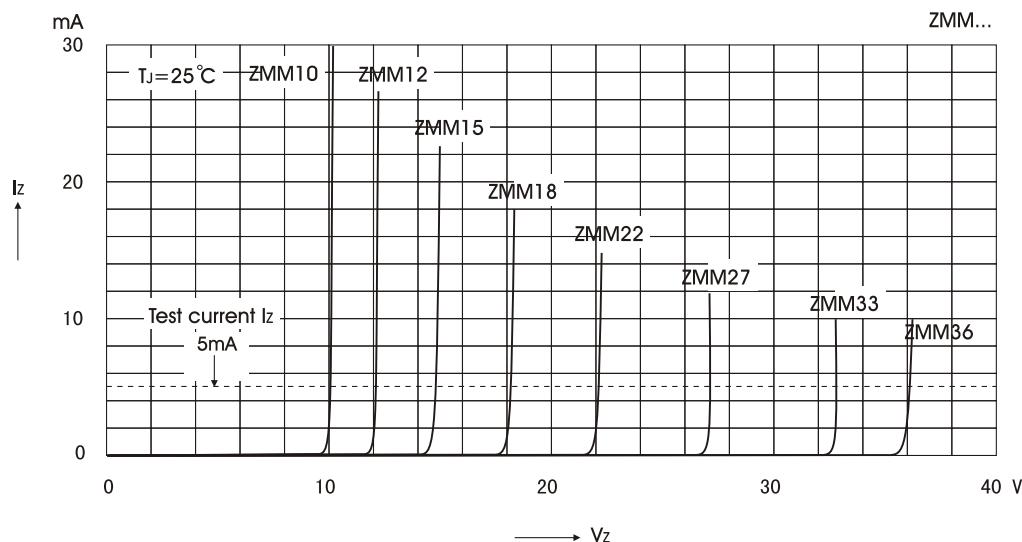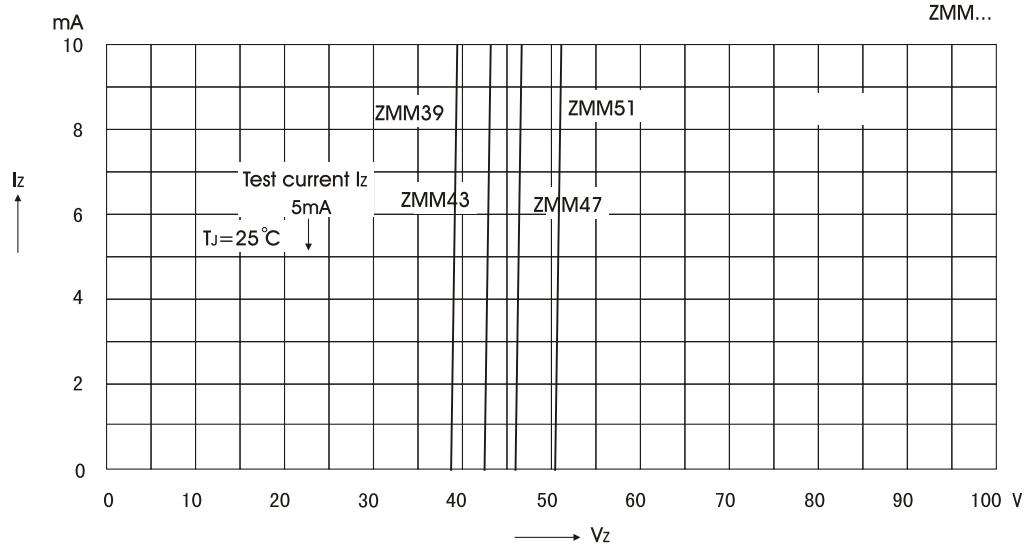
## Forward Characteristics

mA  ZMM..

$I_F$

$T_J$=100℃

$T_J$=25℃

$V_F$
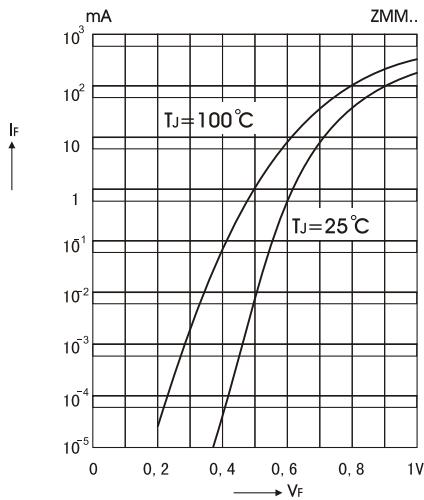
## Admissible power dissipation versus ambient temperature

**valid provided that electrodes are kept at ambient temperature**

mW..  ZMM..

$P_{tot}$

$T_{amb}$
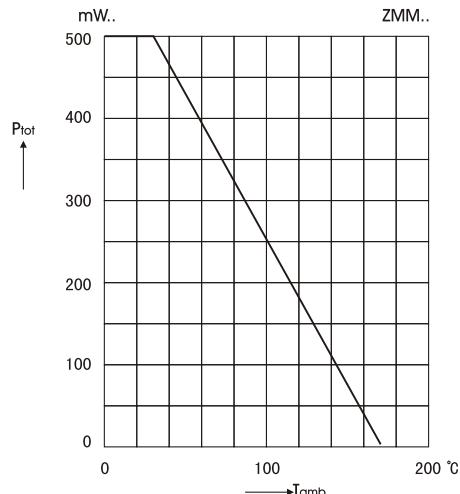
## Pulse thermal resistance versus pulse duration



## Dynamic resistance versus Zener current
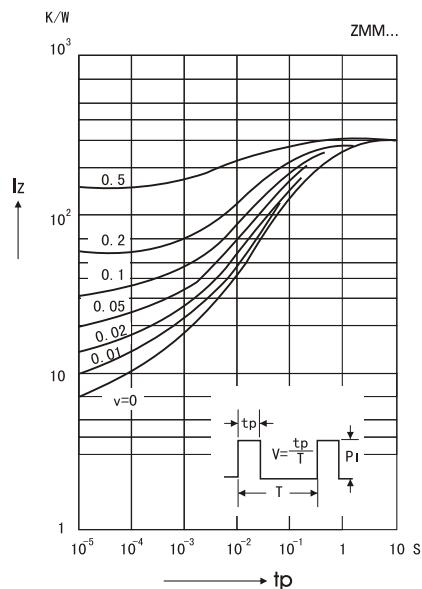


## Capacitance versus Zener voltage
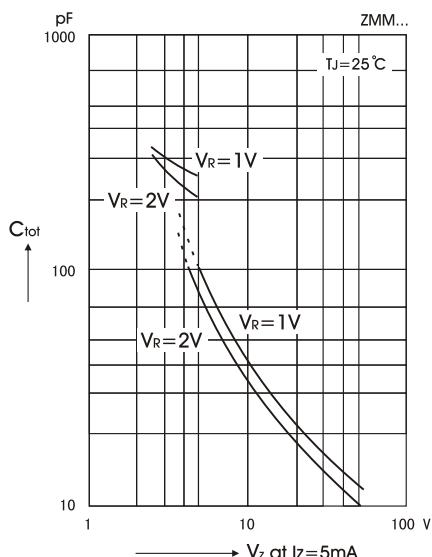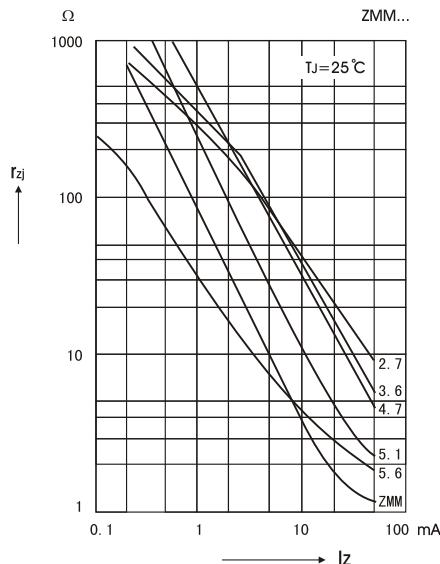


## Dynamic resistance versus Zener current



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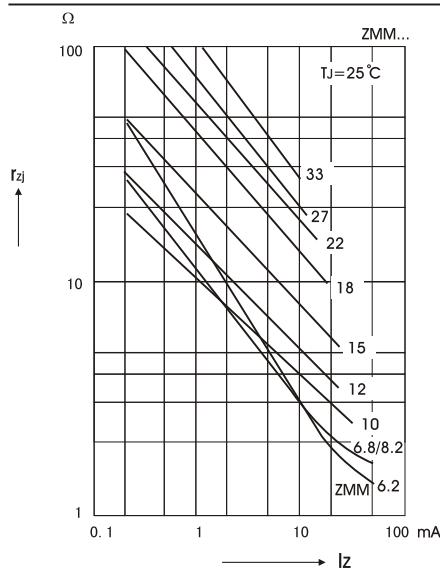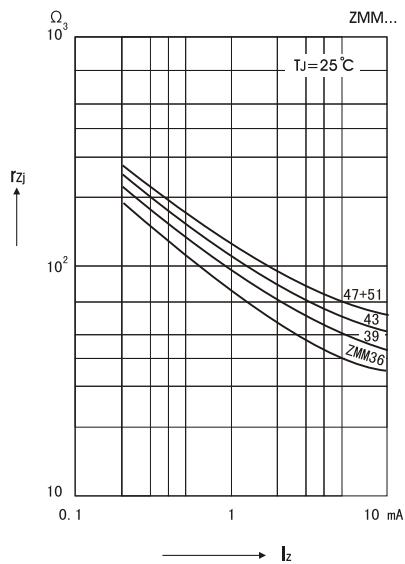
## Dynamic resistance versus Zener current
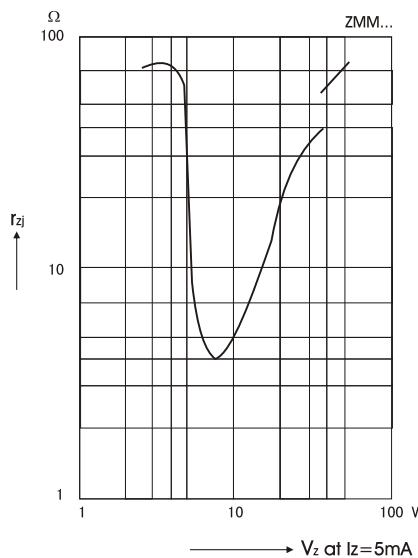


## Thermal differential resistance versus Zener voltage
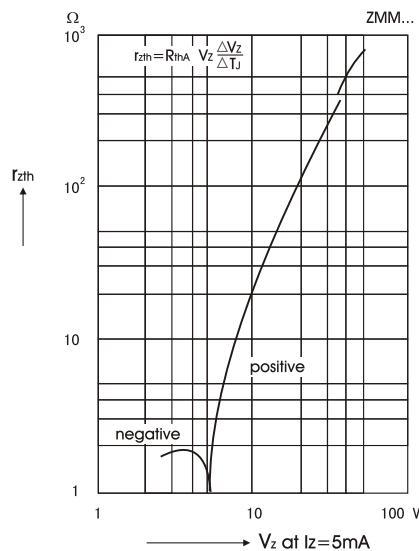


## Dynamic resistance versus Zener voltage



## Temperature dependence of Zener voltage versus voltage
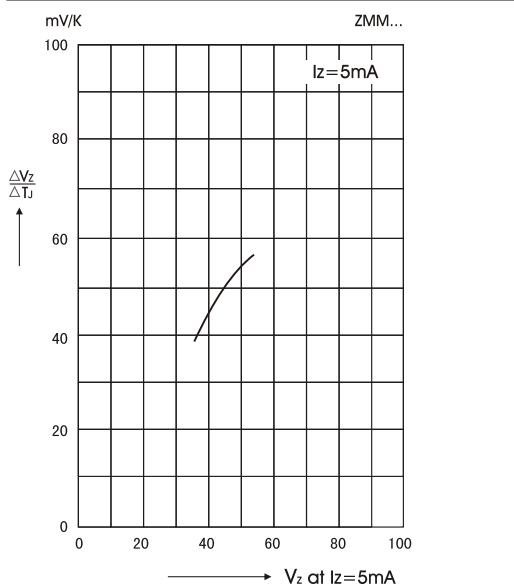


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Temperature dependence of
Zener voltage versus voltage



Change of Zener voltage
versus junction temperature
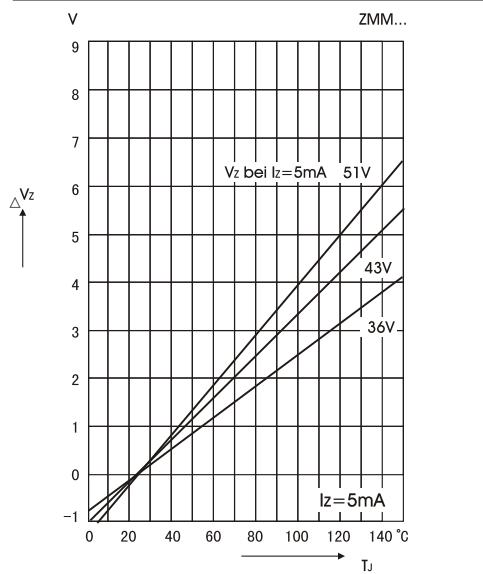


Change of Zener voltage
versus junction temperature
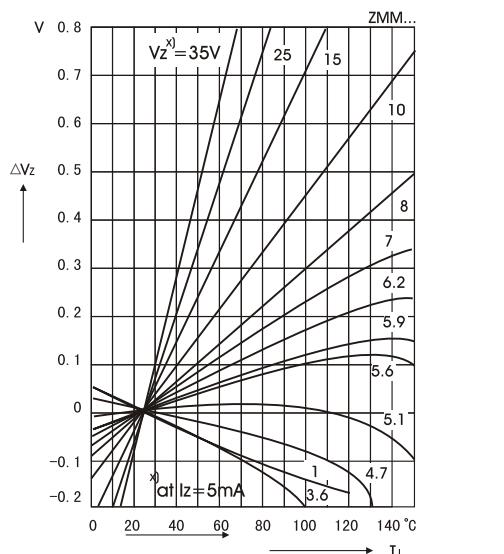


Change of Zener voltage from turn−on
up to the point of thermal equilibrium
versus Zener voltage

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