# VOLTAGE REGULATOR DIODES

Silicon planar diodes in DO-34 envelopes intended for use as low voltage stabilizers or voltage references. They are available in international standardized E24 (± 5%) range and ± 2% tolerance range. The series consists of 37 types with nominal working voltages ranging from 2,4 V to 75 V.

## QUICK REFERENCE DATA

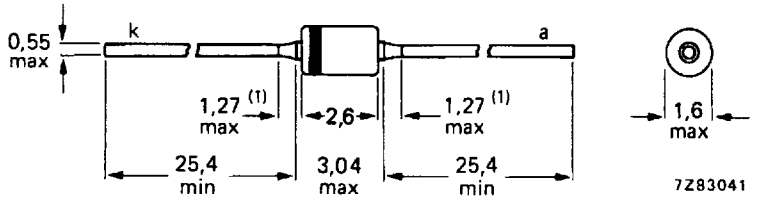
| | | | |
|---|---|---|---|
| Working voltage range | $V_Z$ | nom. | 2,4 to 75 V |
| Total power dissipation | $P_{tot}$ | max. | 500 mW* |
| Non-repetitive peak reverse power dissipation | $P_{ZSM}$ | max. | 30 W |
| Junction temperature | $T_j$ | max. | 200 °C |
| Thermal resistance from junction to tie-point | $R_{th\ j\text{-}tp}$ | = | 0,30 K/mW |

* If leads are kept at $T_{tp}$ = 50 °C at 8 mm from body.

## MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-68 (DO-34).




(1) Lead diameter in this zone uncontrolled.
The marking band indicates the cathode.
The diodes are type branded.

## RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | | | |
|---|---|---|---|---|
| Average forward current (averaged over any 20 ms period) | $I_{F(AV)}$ | max. | 250 | mA |
| Repetitive peak forward current | $I_{FRM}$ | max. | 250 | mA |
| Total power dissipation | $P_{tot}$ | max. | 500 | mW* |
| | | max. | 400 | mW** |
| Non-repetitive peak reverse power dissipation $t = 100\ \mu s$; $T_j = 150\ ^oC$ | $P_{ZSM}$ | max. | 30 | W |
| Storage temperature | $T_{stg}$ | | −65 to + 200 | °C |
| Junction temperature | $T_j$ | max. | 200 | °C |

## THERMAL RESISTANCE

| | | | | |
|---|---|---|---|---|
| From junction to tie-point | $R_{th\ j\text{-}tp}$ | | 0,30 | K/mW* |
| From junction to ambient | $R_{th\ j\text{-}a}$ | = | 0,38 | K/mW** |

## CHARACTERISTICS

$T_j = 25\ ^oC$

| | | | | | |
|---|---|---|---|---|---|
| Forward voltage $I_F = 100$ mA | | $V_F$ | < | 1,0 | V |
| Reverse current | | | | | |
| BZV60-.2V4 | $V_R = 1$ V | $I_R$ | < | 50 | μA |
| .2V7 | $V_R = 1$ V | $I_R$ | < | 20 | μA |
| .3V0 | $V_R = 1$ V | $I_R$ | < | 10 | μA |
| .3V3 | $V_R = 1$ V | $I_R$ | < | 5 | μA |
| .3V6 | $V_R = 1$ V | $I_R$ | < | 5 | μA |
| .3V9 | $V_R = 1$ V | $I_R$ | < | 3 | μA |
| .4V3 | $V_R = 1$ V | $I_R$ | < | 3 | μA |
| .4V7 | $V_R = 2$ V | $I_R$ | < | 3 | μA |
| .5V1 | $V_R = 2$ V | $I_R$ | < | 2 | μA |
| .5V6 | $V_R = 2$ V | $I_R$ | < | 1 | μA |
| .6V2 | $V_R = 4$ V | $I_R$ | < | 3 | μA |
| .6V8 | $V_R = 4$ V | $I_R$ | < | 2 | μA |
| .7V5 | $V_R = 5$ V | $I_R$ | < | 1 | μA |
| .8V2 | $V_R = 5$ V | $I_R$ | < | 700 | nA |
| .9V1 | $V_R = 6$ V | $I_R$ | < | 500 | nA |
| .10 | $V_R = 7$ V | $I_R$ | < | 200 | nA |
| .11 to .13 | $V_R = 8$ V | $I_R$ | < | 100 | nA |
| .15 to .75 | $V_R = 0{,}7\ V_{Znom}$ | $I_R$ | < | 50 | nA |

. = B for 2% tolerance range

. = C for E24 (+/−5%) tolerance range

* If leads are kept at $T_{tp} = 50\ ^oC$ at max. 8 mm from body. For the types 2V4 and 2V7 the power dissipation is limited by $T_{j\ max} = 150\ ^oC$.

** In still air at maximum lead length up to $T_{amb} = 50\ ^oC$.

$T_j = 25\ ^oC$

E24 (± 5%) logarithmic range

| BZV60-C | working voltage $V_Z$ (V) at $I_{Ztest}$ = 5 mA | | differential resistance $r_{diff}$ (Ω) at $I_{Ztest}$ = 5 mA | | temperature coefficient $S_Z$ (mV/K) at $I_{Ztest}$ = 5 mA | | | differential resistance $r_{diff}$ (Ω) at $I_Z$ = 1 mA | |
|---|---|---|---|---|---|---|---|---|---|
| | min. | max. | typ. | max. | min. | typ. | max. | typ. | max. |
| C2V4 | 2,2 | 2,6 | 70 | 100 | −3,5 | −1,6 | 0 | 275 | 600 |
| C2V7 | 2,5 | 2,9 | 75 | 100 | −3,5 | −2,0 | 0 | 300 | 600 |
| C3V0 | 2,8 | 3,2 | 80 | 95 | −3,5 | −2,1 | 0 | 325 | 600 |
| C3V3 | 3,1 | 3,5 | 85 | 95 | −3,5 | −2,4 | 0 | 350 | 600 |
| C3V6 | 3,4 | 3,8 | 85 | 90 | −3,5 | −2,4 | 0 | 375 | 600 |
| C3V9 | 3,7 | 4,1 | 85 | 90 | −3,5 | −2,5 | 0 | 400 | 600 |
| C4V3 | 4,0 | 4,6 | 80 | 90 | −3,5 | −2,5 | 0 | 410 | 600 |
| C4V7 | 4,4 | 5,0 | 50 | 80 | −3,5 | −1,4 | 0,2 | 425 | 500 |
| C5V1 | 4,8 | 5,4 | 40 | 60 | −2,7 | −0,8 | 1,2 | 400 | 480 |
| C5V6 | 5,2 | 6,0 | 15 | 40 | −2,0 | 1,2 | 2,5 | 80 | 400 |
| C6V2 | 5,8 | 6,6 | 6 | 10 | 0,4 | 2,3 | 3,7 | 40 | 150 |
| C6V8 | 6,4 | 7,2 | 6 | 15 | 1,2 | 3,0 | 4,5 | 30 | 80 |
| C7V5 | 7,0 | 7,9 | 6 | 15 | 2,5 | 4,0 | 5,3 | 30 | 80 |
| C8V2 | 7,7 | 8,7 | 6 | 15 | 3,2 | 4,6 | 6,2 | 40 | 80 |
| C9V1 | 8,5 | 9,6 | 6 | 15 | 3,8 | 5,5 | 7,0 | 40 | 100 |
| C10 | 9,4 | 10,6 | 8 | 20 | 4,5 | 6,4 | 8,0 | 50 | 150 |
| C11 | 10,4 | 11,6 | 10 | 20 | 5,4 | 7,4 | 9,0 | 50 | 150 |
| C12 | 11,4 | 12,7 | 10 | 25 | 6,0 | 8,4 | 10,0 | 50 | 150 |
| C13 | 12,4 | 14,1 | 10 | 30 | 7,0 | 9,4 | 11,0 | 50 | 170 |
| C15 | 13,8 | 15,6 | 10 | 30 | 9,2 | 11,4 | 13,0 | 50 | 200 |
| C16 | 15,3 | 17,1 | 10 | 40 | 10,4 | 12,4 | 14,0 | 50 | 200 |
| C18 | 16,8 | 19,1 | 10 | 45 | 12,4 | 14,4 | 16,0 | 50 | 225 |
| C20 | 18,8 | 21,2 | 15 | 55 | 14,4 | 16,4 | 18,0 | 60 | 225 |
| C22 | 20,8 | 23,3 | 20 | 55 | 16,4 | 18,4 | 20,0 | 60 | 250 |
| C24 | 22,8 | 25,6 | 25 | 70 | 18,4 | 20,4 | 22,0 | 60 | 250 |
| | at $I_{Ztest}$ = 2 mA | | at $I_{Ztest}$ = 2 mA | | at $I_{Ztest}$ = 2 mA | | | at $I_Z$ = 0,5 mA | |
| C27 | 25,1 | 28,9 | 25 | 80 | 21,4 | 23,4 | 25,3 | 65 | 300 |
| C30 | 28,0 | 32,0 | 30 | 80 | 24,4 | 26,6 | 29,4 | 70 | 300 |
| C33 | 31,0 | 35,0 | 35 | 80 | 27,4 | 29,7 | 33,4 | 75 | 325 |
| C36 | 34,0 | 38,0 | 35 | 90 | 30,4 | 33,0 | 37,4 | 80 | 350 |
| C39 | 37,0 | 41,0 | 40 | 130 | 33,4 | 36,4 | 41,2 | 80 | 350 |
| C43 | 40,0 | 46,0 | 45 | 150 | 37,6 | 41,2 | 46,6 | 85 | 375 |
| C47 | 44,0 | 50,0 | 50 | 170 | 42,0 | 46,1 | 51,8 | 85 | 375 |
| C51 | 48,0 | 54,0 | 60 | 180 | 46,6 | 51,0 | 57,2 | 90 | 400 |
| C56 | 52,0 | 60,0 | 70 | 200 | 52,2 | 57,0 | 63,8 | 100 | 425 |
| C62 | 58,0 | 66,0 | 80 | 215 | 58,8 | 64,4 | 71,6 | 120 | 450 |
| C68 | 64,0 | 72,0 | 90 | 240 | 65,6 | 71,7 | 79,8 | 150 | 475 |
| C75 | 70,0 | 79,0 | 95 | 255 | 73,4 | 80,2 | 88,6 | 170 | 500 |

$T_j$ = 25 °C

± 2% tolerance range.

| BZV60-B | working voltage $V_Z$ (V) at $I_{Ztest}$ = 5 mA | | differential resistance $r_{diff}$ (Ω) at $I_{Ztest}$ = 5 mA | | temperature coefficient $S_Z$ (mV/K) at $I_{Ztest}$ = 5 mA | | | differential resistance $r_{diff}$ (Ω) at $I_Z$ = 1 mA | |
|---|---|---|---|---|---|---|---|---|---|
| | min. | max. | typ. | max. | min. | typ. | max. | typ. | max. |
| B2V4 | 2,35 | 2,45 | 70 | 100 | −3,5 | −1,6 | 0 | 275 | 600 |
| B2V7 | 2,65 | 2,75 | 75 | 100 | −3,5 | −2,0 | 0 | 300 | 600 |
| B3V0 | 2,94 | 3,06 | 80 | 95 | −3,5 | −2,1 | 0 | 325 | 600 |
| B3V3 | 3,23 | 3,37 | 85 | 95 | −3,5 | −2,4 | 0 | 350 | 600 |
| B3V6 | 3,53 | 3,67 | 85 | 90 | −3,5 | −2,4 | 0 | 375 | 600 |
| B3V9 | 3,82 | 3,98 | 85 | 90 | −3,5 | −2,5 | 0 | 400 | 600 |
| B4V3 | 4,21 | 4,39 | 80 | 90 | −3,5 | −2,5 | 0 | 410 | 600 |
| B4V7 | 4,61 | 4,79 | 50 | 80 | −3,5 | −1,4 | 0,2 | 425 | 500 |
| B5V1 | 5,00 | 5,20 | 40 | 60 | −2,7 | -0,8 | 1,2 | 400 | 480 |
| B5V6 | 5,49 | 5,71 | 15 | 40 | −2,0 | 1,2 | 2,5 | 80 | 400 |
| B6V2 | 6,08 | 6,32 | 6 | 10 | 0,4 | 2,3 | 3,7 | 40 | 150 |
| B6V8 | 6,66 | 6,94 | 6 | 15 | 1,2 | 3,0 | 4,5 | 30 | 80 |
| B7V5 | 7,35 | 7,65 | 6 | 15 | 2,5 | 4,0 | 5,3 | 30 | 80 |
| B8V2 | 8,04 | 8,36 | 6 | 15 | 3,2 | 4,6 | 6,2 | 40 | 80 |
| B9V1 | 8,92 | 9,28 | 6 | 15 | 3,8 | 5,5 | 7,0 | 40 | 100 |
| B10 | 9,80 | 10,20 | 8 | 20 | 4,5 | 6,4 | 8,0 | 50 | 150 |
| B11 | 10,80 | 11,20 | 10 | 20 | 5,4 | 7,4 | 9,0 | 50 | 150 |
| B12 | 11,80 | 12,20 | 10 | 25 | 6,0 | 8,4 | 10,0 | 50 | 150 |
| B13 | 12,70 | 13,30 | 10 | 30 | 7,0 | 9,4 | 11,0 | 50 | 170 |
| B15 | 14,70 | 15,30 | 10 | 30 | 9,2 | 11,4 | 13,0 | 50 | 200 |
| B16 | 15,70 | 16,30 | 10 | 40 | 10,4 | 12,4 | 14,0 | 50 | 200 |
| B18 | 17,60 | 18,40 | 10 | 45 | 12,4 | 14,4 | 16,0 | 50 | 225 |
| B20 | 19,60 | 20,40 | 15 | 55 | 14,4 | 16,4 | 18,0 | 60 | 225 |
| B22 | 21,60 | 22,40 | 20 | 55 | 16,4 | 18,4 | 20,0 | 60 | 250 |
| B24 | 23,50 | 24,50 | 25 | 70 | 18,4 | 20,4 | 22,0 | 60 | 250 |
| | at $I_{Ztest}$ = 2 mA | | at $I_{Ztest}$ = 2 mA | | at $I_{Ztest}$ = 2 mA | | | at $I_Z$ = 0,5 mA | |
| B27 | 26,50 | 27,50 | 25 | 80 | 21,4 | 23,4 | 25,3 | 65 | 300 |
| B30 | 29,40 | 30,60 | 30 | 80 | 24,4 | 26,6 | 29,4 | 70 | 300 |
| B33 | 32,30 | 33,70 | 35 | 80 | 27,4 | 29,7 | 33,4 | 75 | 325 |
| B36 | 35,30 | 36,70 | 35 | 90 | 30,4 | 33,0 | 37,4 | 80 | 350 |
| B39 | 38,20 | 39,80 | 40 | 130 | 33,4 | 36,4 | 41,2 | 80 | 350 |
| B43 | 42,10 | 43,90 | 45 | 150 | 37,6 | 41,2 | 46,6 | 85 | 375 |
| B47 | 46,10 | 47,90 | 50 | 170 | 42,0 | 46,1 | 51,8 | 85 | 375 |
| B51 | 50,00 | 52,00 | 60 | 180 | 46,6 | 51,0 | 57,2 | 90 | 400 |
| B56 | 54,90 | 57,10 | 70 | 200 | 52,2 | 57,0 | 63,8 | 100 | 425 |
| B62 | 60,80 | 63,20 | 80 | 215 | 58,8 | 64,4 | 71,6 | 120 | 450 |
| B68 | 66,60 | 69,40 | 90 | 240 | 65,6 | 71,7 | 79,8 | 150 | 475 |
| B75 | 73,50 | 76,50 | 95 | 255 | 73,4 | 80,2 | 88,6 | 170 | 500 |

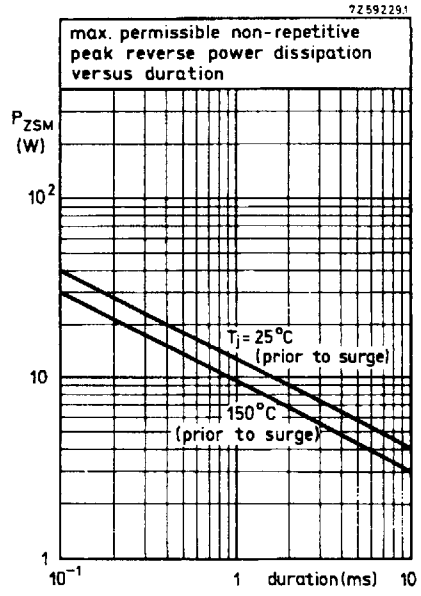



Fig. 2.

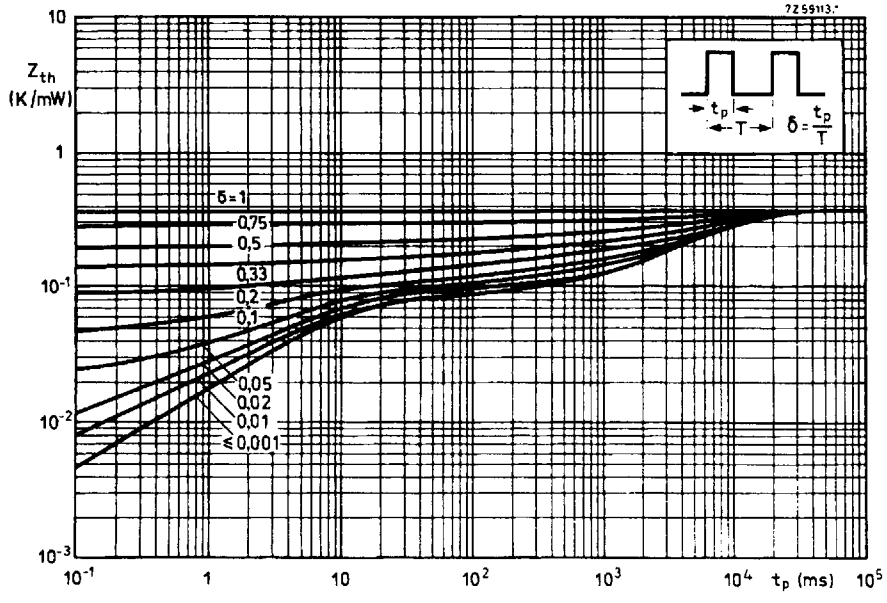



Fig. 3.

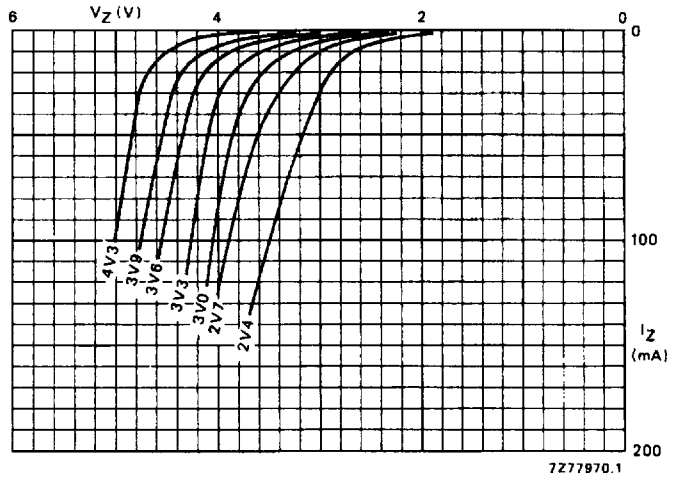



Fig. 4 Static characteristics; typical values; $T_{amb}$ = 25 °C.

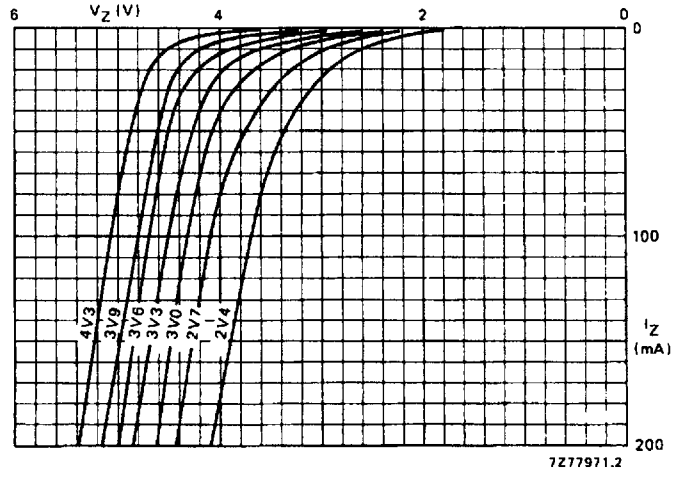



Fig. 5 Dynamic characteristics; typical values; $T_j$ = 25 °C.

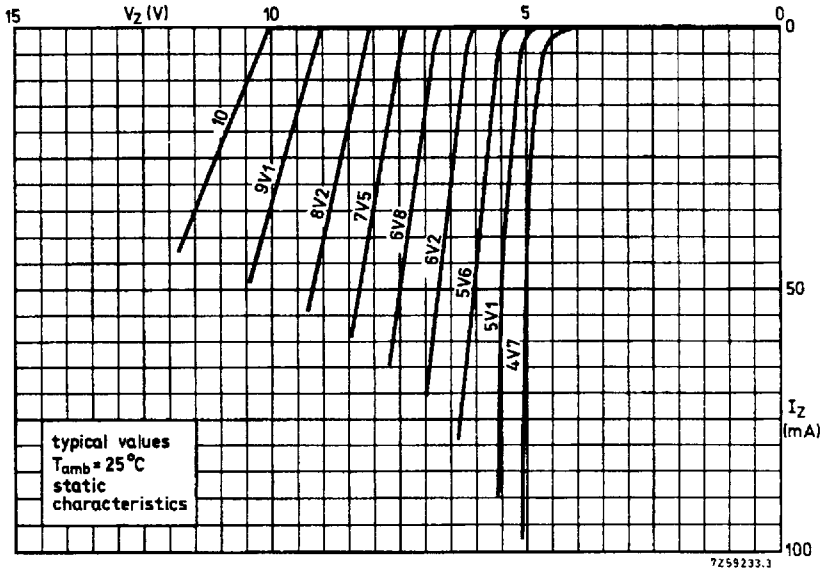



Fig. 6.

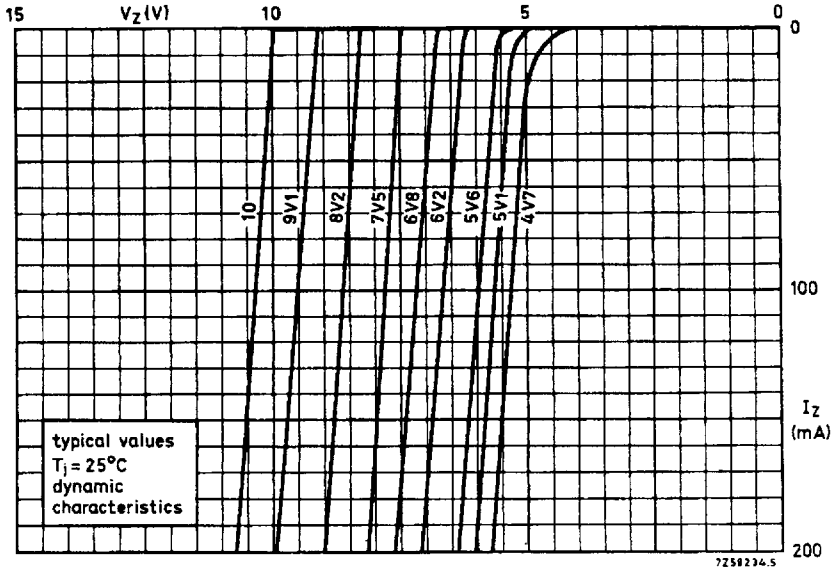



Fig. 7.

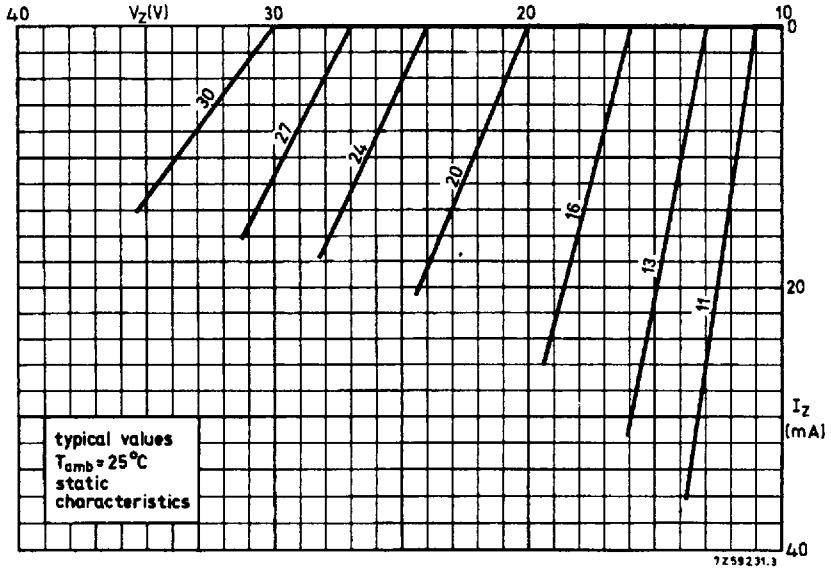



Fig. 8.

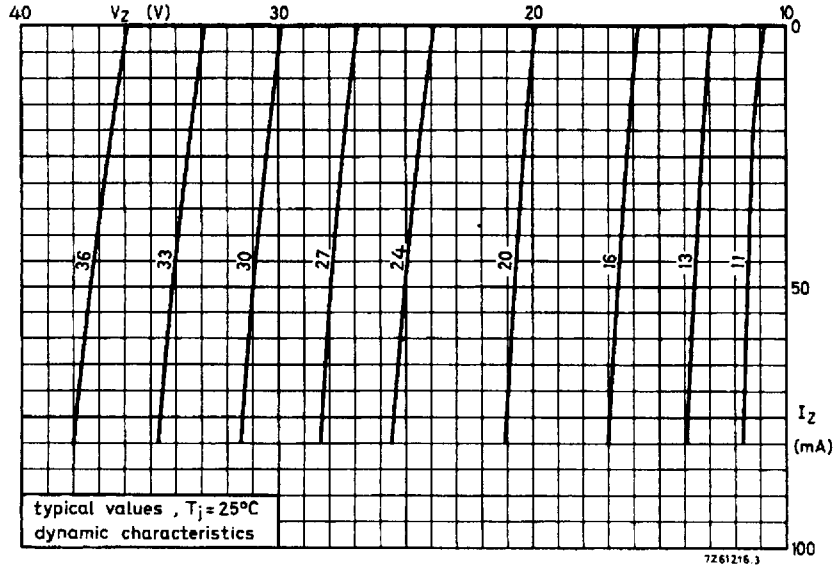



Fig. 9.

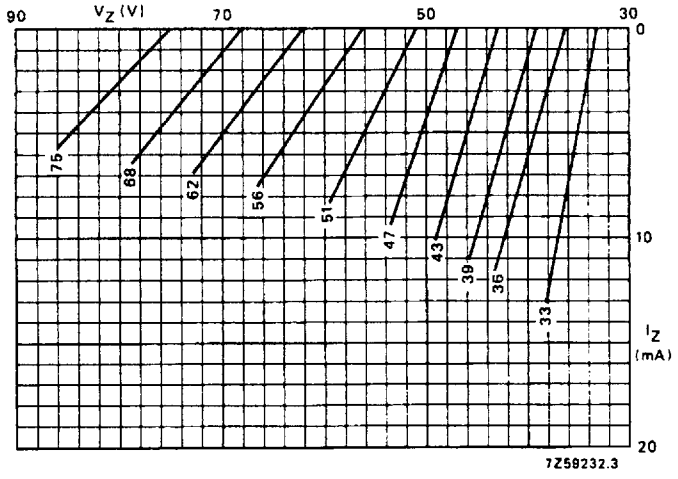



Fig. 10 Static characteristics; typical values; $T_{amb}$ = 25 °C.

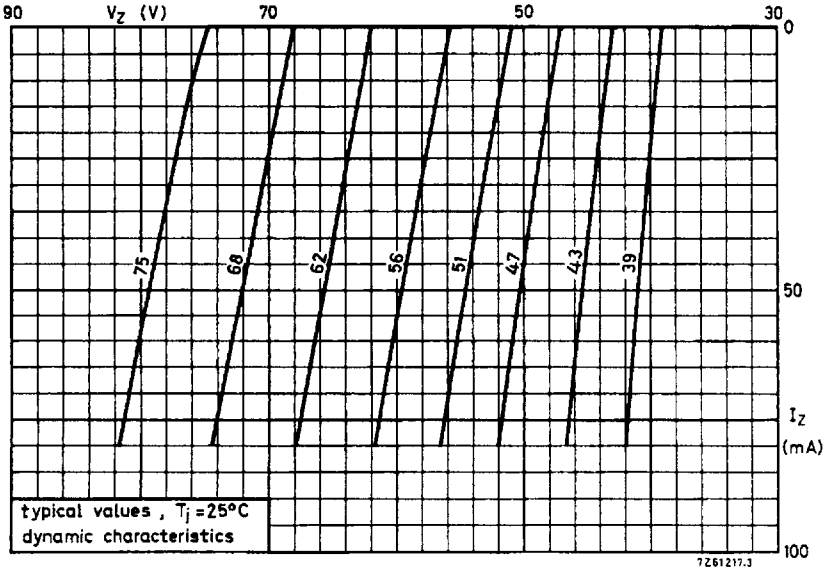



Fig. 11.

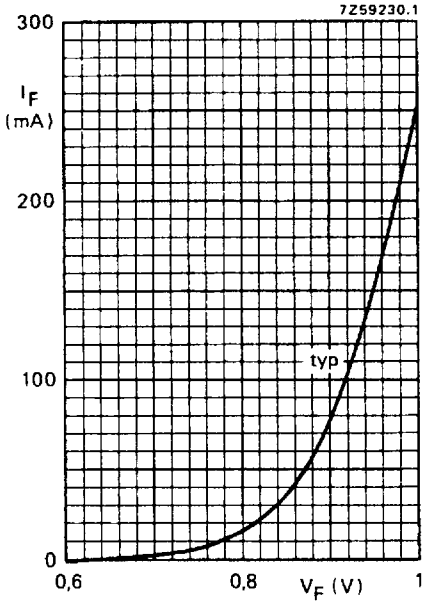



Fig. 12 $T_j$ = 25 °C.

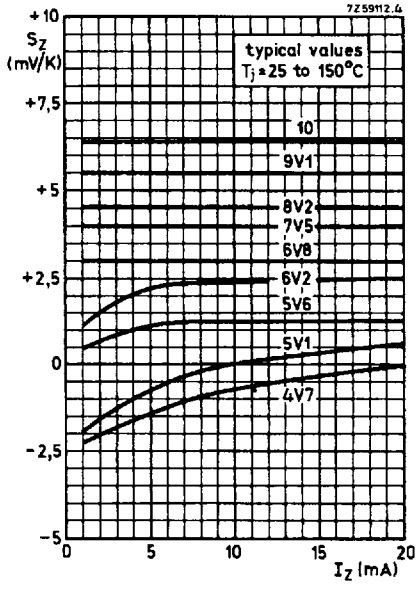



Fig. 13.

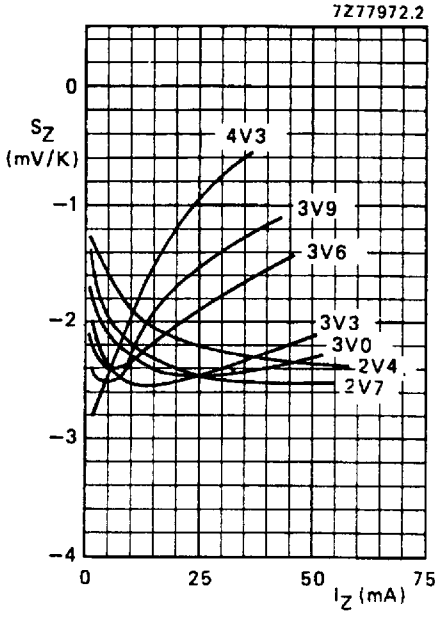



Fig. 14 Typical values; $T_j$ = 25 to 150 °C.

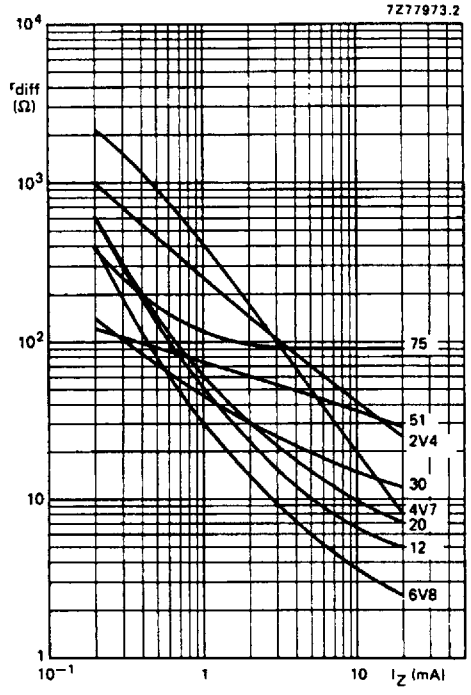



Fig. 15 Typical values; $T_j$ = 25 °C; f = 1 kHz.

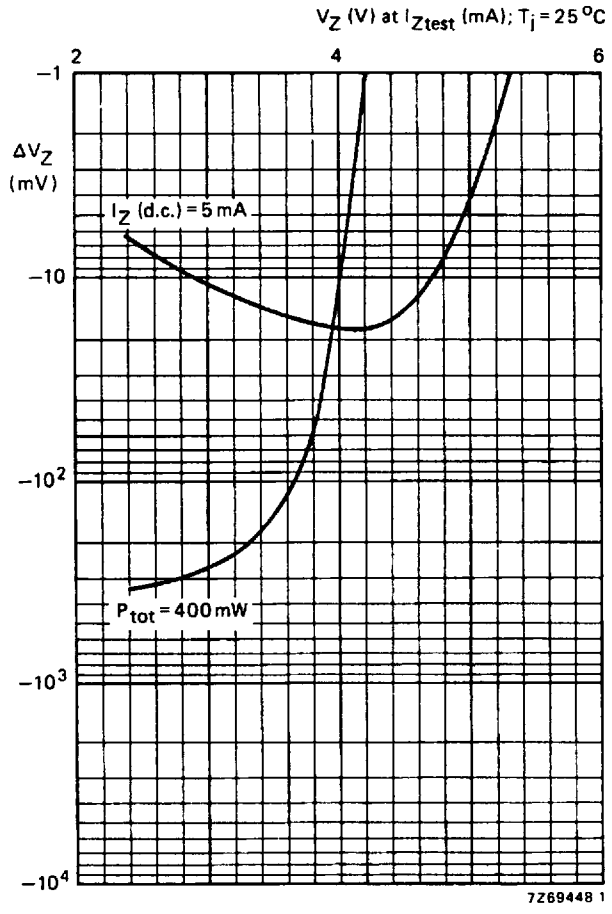



Fig. 16 Typical change of working voltage under operating conditions at $T_{amb}$ = 25 °C.

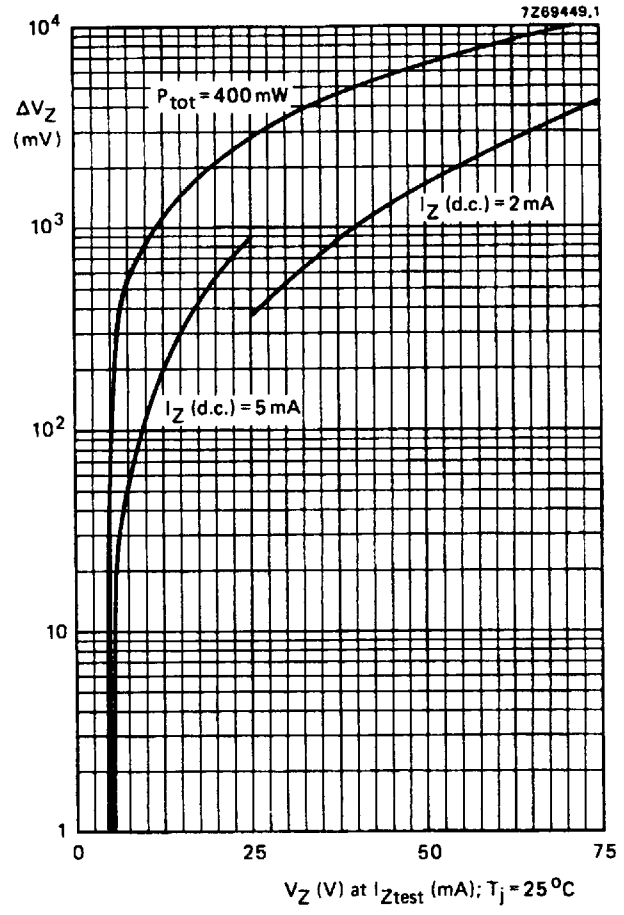



Fig. 17 Typical change of working voltage under operating conditions at $T_{amb}$ = 25 °C.