SILICON PLANAR VOLTAGE REGULATOR DIODES

Silicon planar voltage regulator diodes, in a SOT-89 plastic envelope, intended for stabilization applications in thick and thin-film circuits.

The series covers the normalized range of nominal working voltages from 2,4 V to 75 V with a tolerance of ± 5% (international standard E24 range).

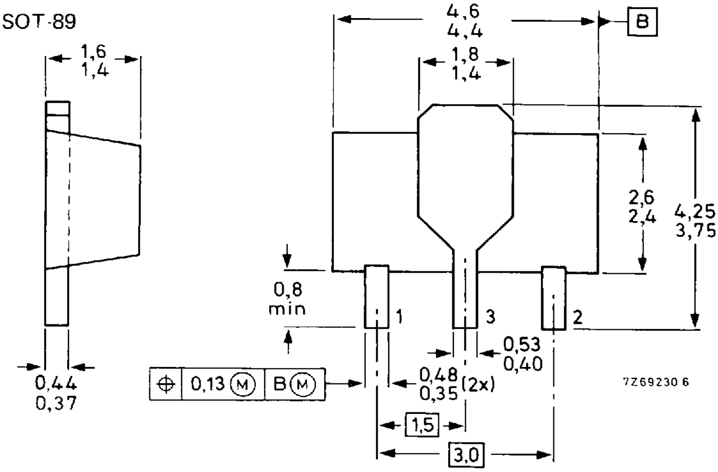
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	2,4 to 75	V
Working voltage tolerance (E24 range)			±5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	150	°C

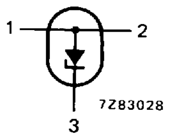
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-89



BOTTOM VIEW



Marking code

BZV49- C2V4 = 2Y4
C2V7 = 2Y7
C3V0 = 3Y0
C3V3 = 3Y3
C3V6 = 3Y6
C3V9 = 3Y9
C4V3 = 4Y3
C4V7 = 4Y7
C5V1 = 5Y1
C5V6 = 5Y6
C6V2 = 6Y2
C6V8 = 6Y8
C7V5 = 7Y5
C8V2 = 8Y2
C9V1 = 9Y1
C10 = 10Y
C11 = 11Y
C12 = 12Y
C13 = 13Y
C15 = 15Y
C16 = 16Y
C18 = 18Y
C20 = 20Y
C22 = 22Y
C24 = 24Y
C27 = 27Y
C30 = 30Y
C33 = 33Y
C36 = 36Y
C39 = 39Y
C43 = 43Y
C47 = 47Y
C51 = 51Y
C56 = 56Y
C62 = 62Y
C68 = 68Y
C75 = 75Y

RATINGS

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

Repetitive peak forward current	I_{FRM}	max.	250	mA
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250	mA
Working current (d.c.)	I_Z	limited by $P_{tot\ max}$		
Total power dissipation * up to $T_{amb} = 25\ ^oC$	P_{tot}	max.	1	W
Non-repetitive peak reverse power dissipation * $T_j = 25\ ^oC$; $t_p = 100\ \mu s$	P_{ZSM}	max.	40	W
Storage temperature	T_{stg}		−65 to +150	^oC
Junction temperature	T_j	max.	150	^oC

THERMAL RESISTANCE

From junction to collector tab	$R_{th\ j\text{-}tab}$	=	15	K/W
From junction to ambient in free air *	$R_{th\ j\text{-}a}$	=	125	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$

Forward voltage $I_F = 50$ mA		V_F	$<$	1,0	V
Reverse current					
BZV49- C2V4	$V_R = 1$ V	I_R	$<$	50	µA
C2V7	$V_R = 1$ V	I_R	$<$	20	µA
C3V0	$V_R = 1$ V	I_R	$<$	10	µA
C3V3	$V_R = 1$ V	I_R	$<$	5	µA
C3V6	$V_R = 1$ V	I_R	$<$	5	µA
C3V9	$V_R = 1$ V	I_R	$<$	3	µA
C4V3	$V_R = 1$ V	I_R	$<$	3	µA
C4V7	$V_R = 2$ V	I_R	$<$	3	µA
C5V1	$V_R = 2$ V	I_R	$<$	2	µA
C5V6	$V_R = 2$ V	I_R	$<$	1	µA
C6V2	$V_R = 4$ V	I_R	$<$	3	µA
C6V8	$V_R = 4$ V	I_R	$<$	2	µA
C7V5	$V_R = 5$ V	I_R	$<$	1	µA
C8V2	$V_R = 5$ V	I_R	$<$	700	nA
C9V1	$V_R = 6$ V	I_R	$<$	500	nA
C10	$V_R = 7$ V	I_R	$<$	200	nA
C11 to C13	$V_R = 8$ V	I_R	$<$	100	nA
C15 to C75	$V_R = 0,7\ V_{Znom}$	I_R	$<$	50	nA

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* Device mounted on a ceramic substrate: area = 2,5 cm^2; thickness = 0,7 mm.

$T_j = 25\ ^{\circ}C$

E24 logarithmic range (tolerance ± 5%)

BZV49-...	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			diode capacitance C_d(pF); f = 1 MHz V_R = 0	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
C2V4	2,2	2,6	70	100	−3,5	−1,6	0	375	450
C2V7	2,5	2,9	75	100	−3,5	−2,0	0	350	450
C3V0	2,8	3,2	80	95	−3,5	−2,1	0	350	450
C3V3	3,1	3,5	85	95	−3,5	−2,4	0	325	450
C3V6	3,4	3,8	85	90	−3,5	−2,4	0	300	450
C3V9	3,7	4,1	85	90	−3,5	−2,5	0	300	450
C4V3	4,0	4,6	80	90	−3,5	−2,5	0	275	450
C4V7	4,4	5,0	50	80	−3,5	−1,4	0,2	130	180
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	110	160
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	95	140
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	90	130
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	85	110
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	80	100
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	75	95
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	70	90
C10	9,4	10,6	8	20	4,5	6,4	8,0	70	90
C11	10,4	11,6	10	20	5,4	7,4	9,0	65	85
C12	11,4	12,7	10	25	6,0	8,4	10,0	65	85
C13	12,4	14,1	10	30	7,0	9,4	11,0	60	80
C15	13,8	15,6	10	30	9,2	11,4	13,0	55	75
C16	15,3	17,1	10	40	10,4	12,4	14,0	52	75
C18	16,8	19,1	10	45	12,4	14,4	16,0	47	70
C20	18,8	21,2	15	55	14,4	16,4	18,0	36	60
C22	20,8	23,3	20	55	16,4	18,4	20,0	34	60
C24	22,8	25,6	25	70	18,4	20,4	22,0	33	55
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA				
C27	25,1	28,9	25	80	21,4	23,4	25,3	30	50
C30	28,0	32,0	30	80	24,4	26,6	29,4	27	50
C33	31,0	35,0	35	80	27,4	29,7	33,4	25	45
C36	34,0	38,0	35	90	30,4	33,0	37,4	23	45
C39	37,0	41,0	40	130	33,4	36,4	41,2	21	45
C43	40,0	46,0	45	150	37,6	41,2	46,6	21	40
C47	44,0	50,0	50	170	42,0	46,1	51,8	19	40
C51	48,0	54,0	60	180	46,6	51,0	57,2	19	40
C56	52,0	60,0	70	200	52,2	57,0	63,8	18	40
C62	58,0	66,0	80	215	58,8	64,4	71,6	17	35
C68	64,0	72,0	90	240	65,6	71,7	79,8	17	35
C75	70,0	79,0	95	255	73,4	80,2	88,6	16,5	35

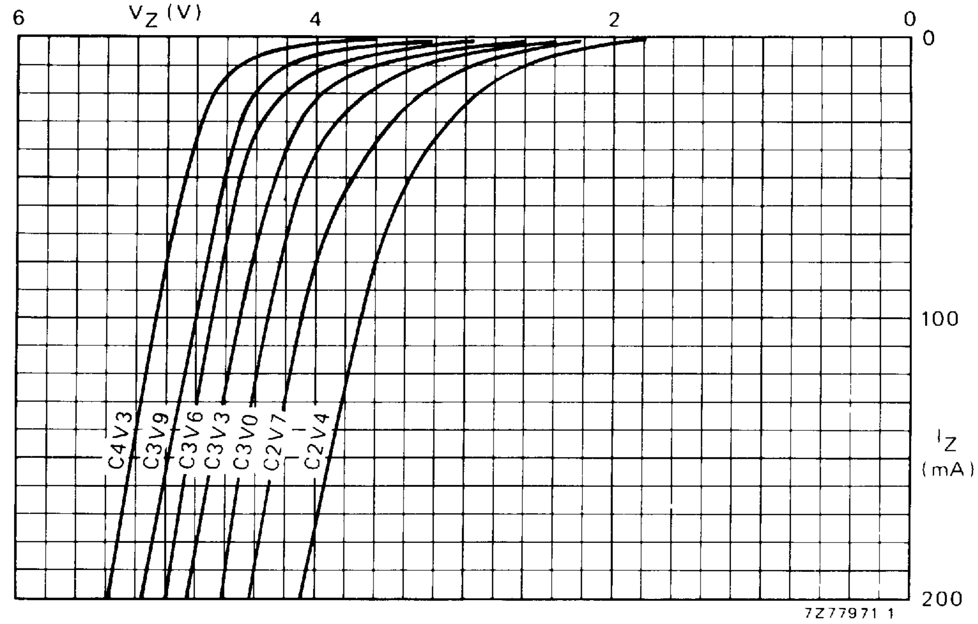

Fig. 2 Dynamic characteristics; typical values; $T_j = 25\ ^{\circ}C$.

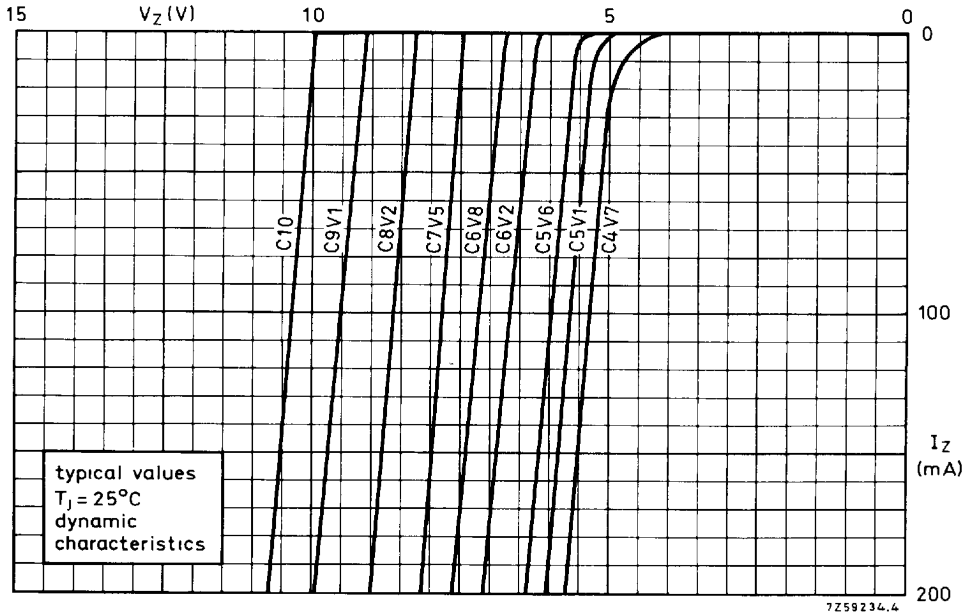

Fig. 3 Dynamic characteristics; typical values at $T_j = 25\ ^{\circ}C$.

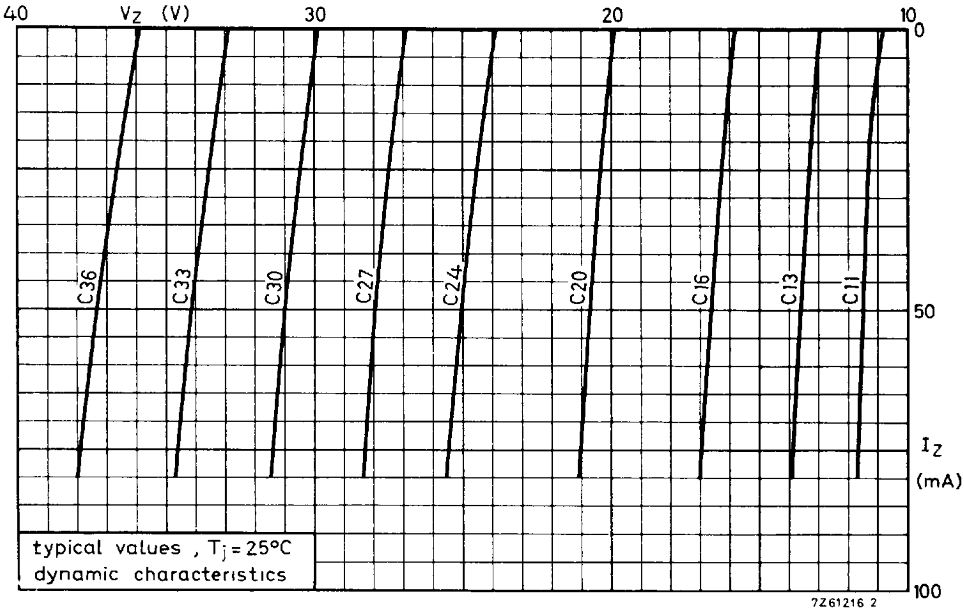

Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

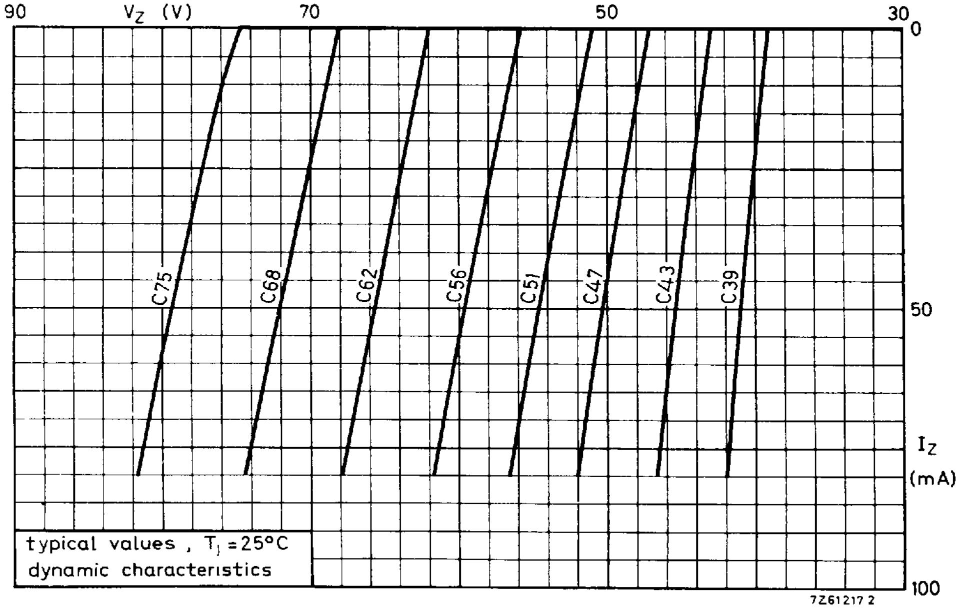

Fig. 5 Dynamic characteristics; typical values at T_j = 25 °C.

Model for calculating the static working voltage ($V_{Z\ stat}$).

This model can be derived from $V_{Z\ stat} = V_{Z\ dyn} + \Delta V_Z$ of which $V_{Z\ dyn}$ is given in the preceding tables and can be derived from the typical dynamic characteristic curves (Figs 2, 3, 4 and 5)
$\Delta V_Z = \Delta T \times S_Z$. For S_Z see tables and graphs S_Z versus T_j.
$\Delta T = P_{tot} \times R_{th\ j\text{-}a} = I_Z \times V_{Z\ dyn} \times R_{th\ j\text{-}a}$.
Following $\Delta V_Z = I_Z \times V_{Z\ dyn} \times R_{th\ j\text{-}a} \times S_Z$ and the model will be:

$$V_{Z\ stat} = V_{Z\ dyn} + I_Z \times V_{Z\ dyn} \times R_{th\ j\text{-}a} \times S_Z$$

Calculating example

BZV49-C24 mounted on a ceramic substrate of 7 x 5 x 0,6 mm; at $I_Z = 7$ mA.

$$V_{Z\ stat} = 24 + \left(\frac{7}{1000} \times 24 \times \frac{125}{1000} \times 20{,}3\right)$$
$$= 24 + 0{,}4 = 24{,}4\ \text{V}.$$

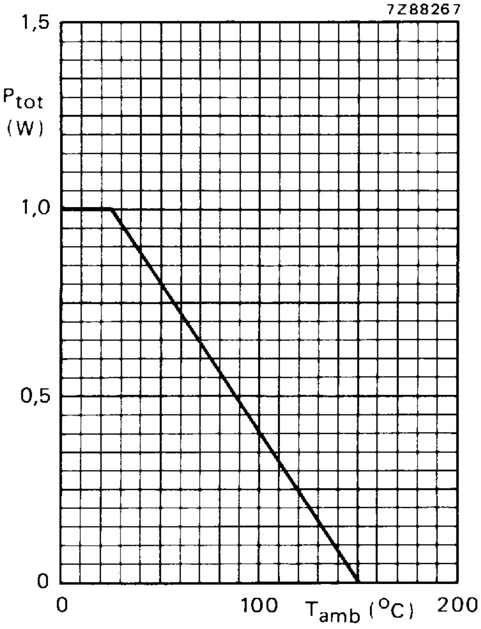

Fig. 6 Power derating curve.

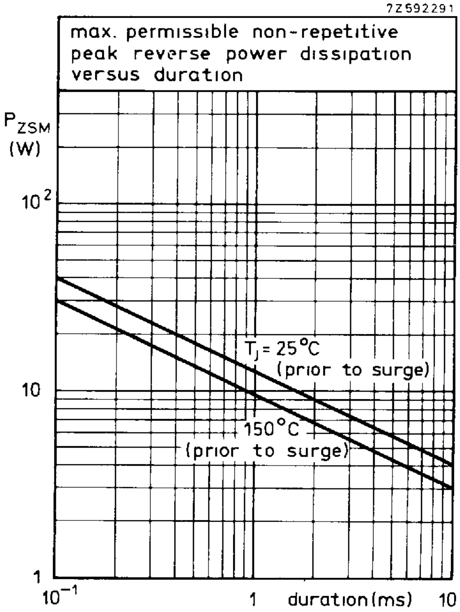

Fig. 7.

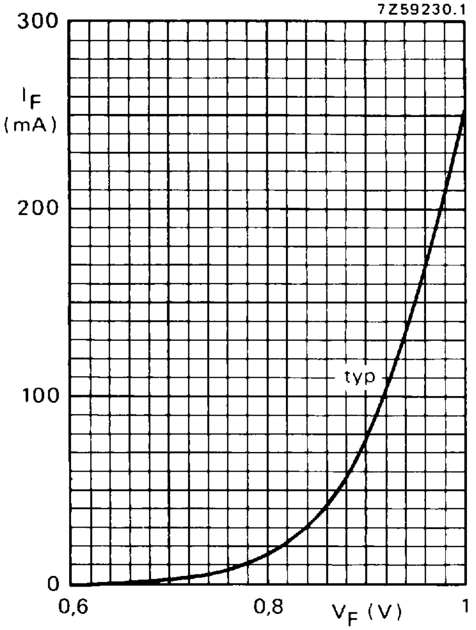

Fig. 8 T_j = 25 °C.

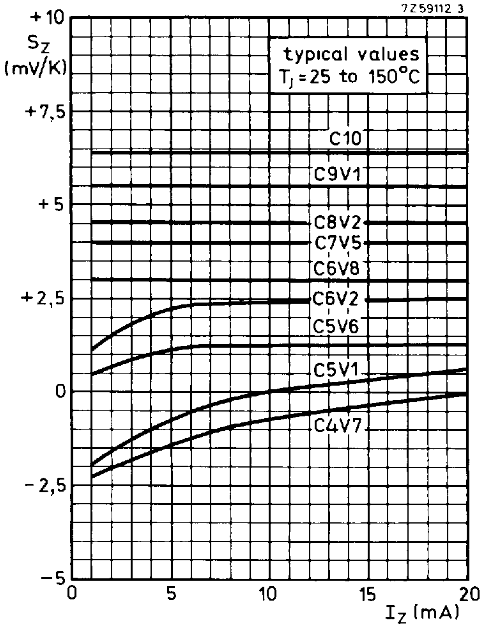

Fig. 9.

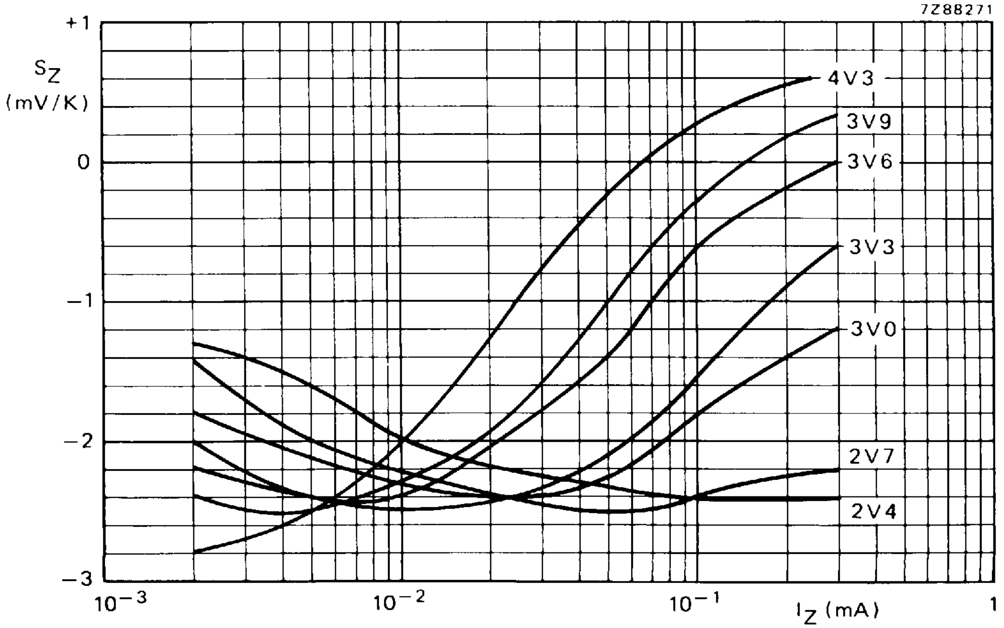

Fig. 10 Typical values temperature coefficient.

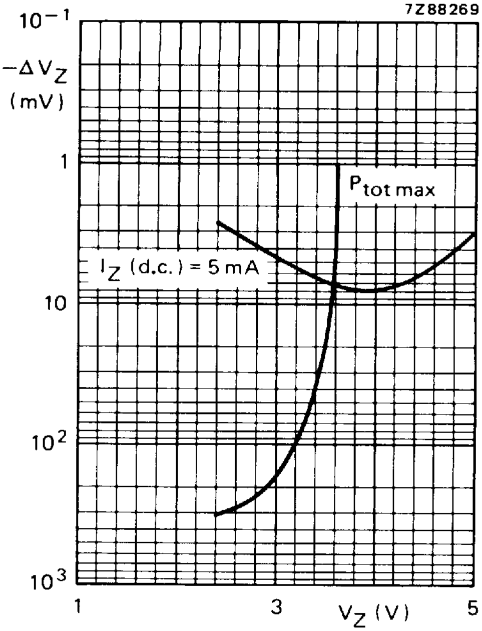

Fig. 11 Typical change of working voltage; T_j = 25 °C.

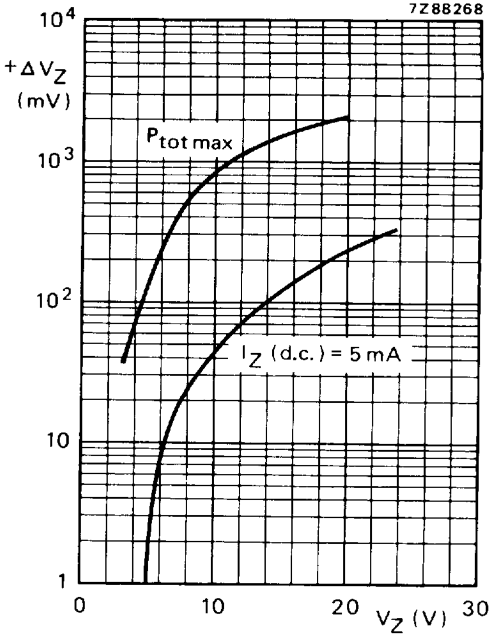

Fig. 12 Typical change of working voltage; T_{amb} = 25 °C.

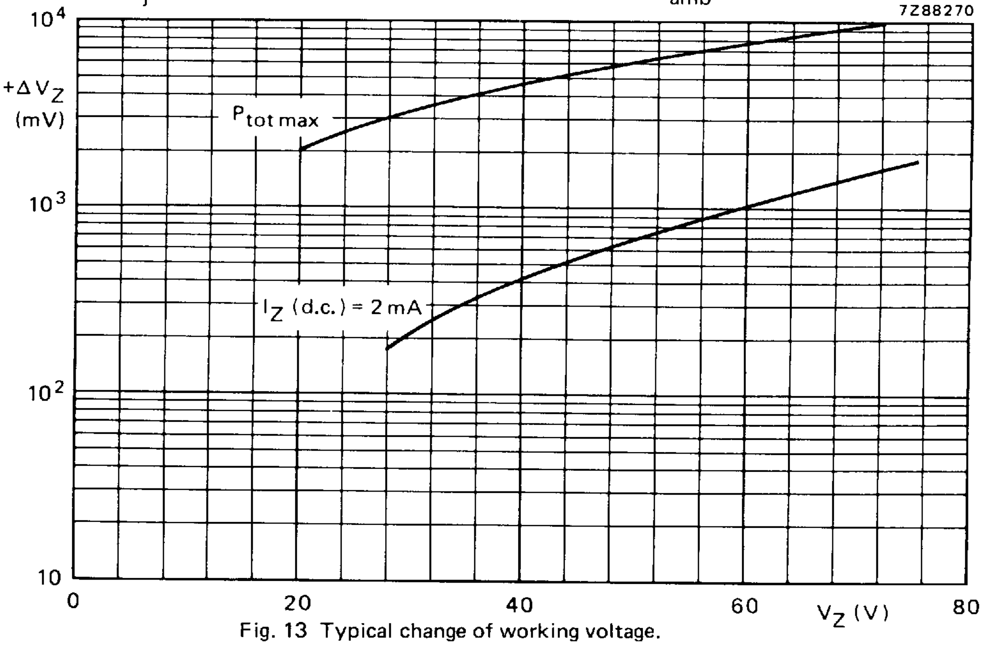

Fig. 13 Typical change of working voltage.

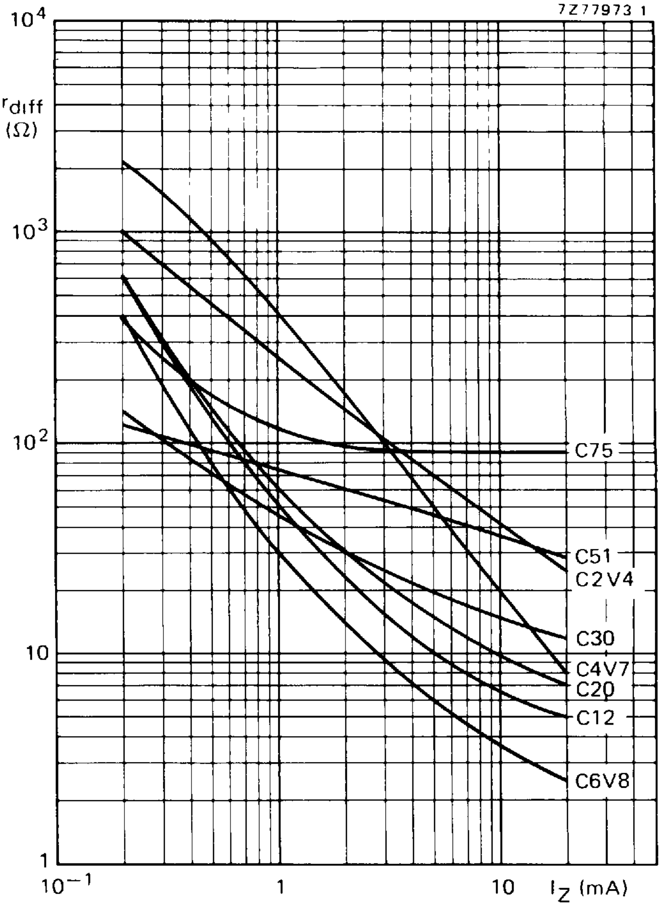

Fig. 14 Typical values; T_j = 25 °C; f = 1 kHz.