SILICON PLANAR VOLTAGE REGULATOR DIODES

Silicon planar voltage regulator diodes, in a SOT223 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.	1.3	W
Junction temperature	T_j	max.	150	°C

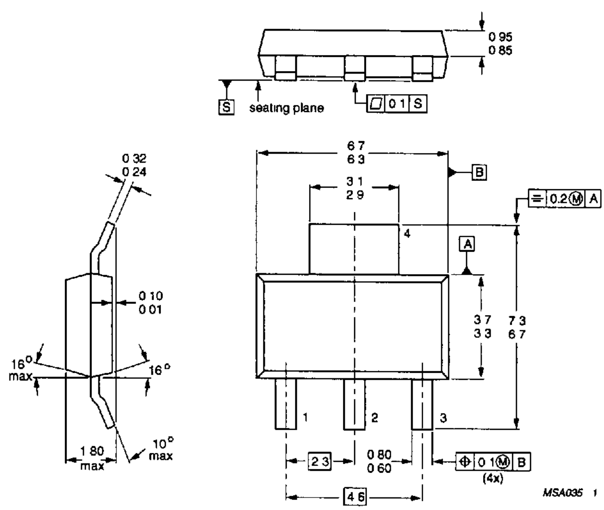
MECHANICAL DATA

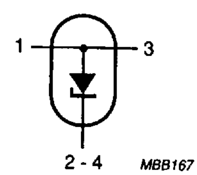
Dimensions in mm

Fig.1 SOT223.

Pinning

1 = anode
2 = cathode
3 = anode
4 = cathode





RATINGS

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

Repetitive peak forward current	I_{FRM}	max.	400 mA
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	400 mA
Working current (DC)	I_Z	limited by $P_{tot\ max}$	
Total power dissipation up to T_{amb} = 25 °C (note 1)	P_{tot}	max.	1.3 W
Non-repetitive peak reverse power dissipation T_j = 25 °C; t_p = 100 µs	P_{ZSM}	max.	40 W
Storage temperature range	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient in free air (note 1)	$R_{th\ j\text{-}a}$	=	95 K/W

CHARACTERISTICS

T_j = 25 °C

Forward voltage I_F = 50 mA		V_F	max.	1.0 V
Reverse current				
BZV90- C2V4	V_R = 1 V	I_R	max.	50 µA
C2V7	V_R = 1 V	I_R	max.	20 µA
C3V0	V_R = 1 V	I_R	max.	10 µA
C3V3	V_R = 1 V	I_R	max.	5 µA
C3V6	V_R = 1 V	I_R	max.	5 µA
C3V9	V_R = 1 V	I_R	max.	3 µA
C4V3	V_R = 1 V	I_R	max.	3 µA
C4V7	V_R = 2 V	I_R	max.	3 µA
C5V1	V_R = 2 V	I_R	max.	2 µA
C5V6	V_R = 2 V	I_R	max.	1 µA
C6V2	V_R = 4 V	I_R	max.	3 µA
C6V8	V_R = 4 V	I_R	max.	2 µA
C7V5	V_R = 5 V	I_R	max.	1 µA
C8V2	V_R = 5 V	I_R	max.	700 nA
C9V1	V_R = 6 V	I_R	max.	500 nA
C10	V_R = 7 V	I_R	max.	200 nA
C11 to C13	V_R = 8 V	I_R	max.	100 nA
C15 to C75	V_R = 0,7 V_{Znom}	I_R	max.	50 nA

Note

1. Device mounted on an epoxy printed circuit board: 40 mm x 40 mm x 1.5 mm; mounting pad for the cathode lead min. 6 cm^2.

T_j = 25 °C

E24 logarithmic range (tolerance ± 5%)

BZV90-...	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

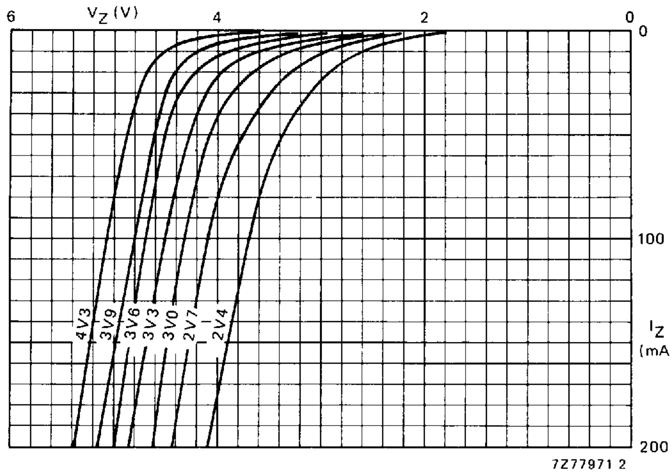


Fig. 2 Dynamic characteristics; typical values; T_j = 25 °C.

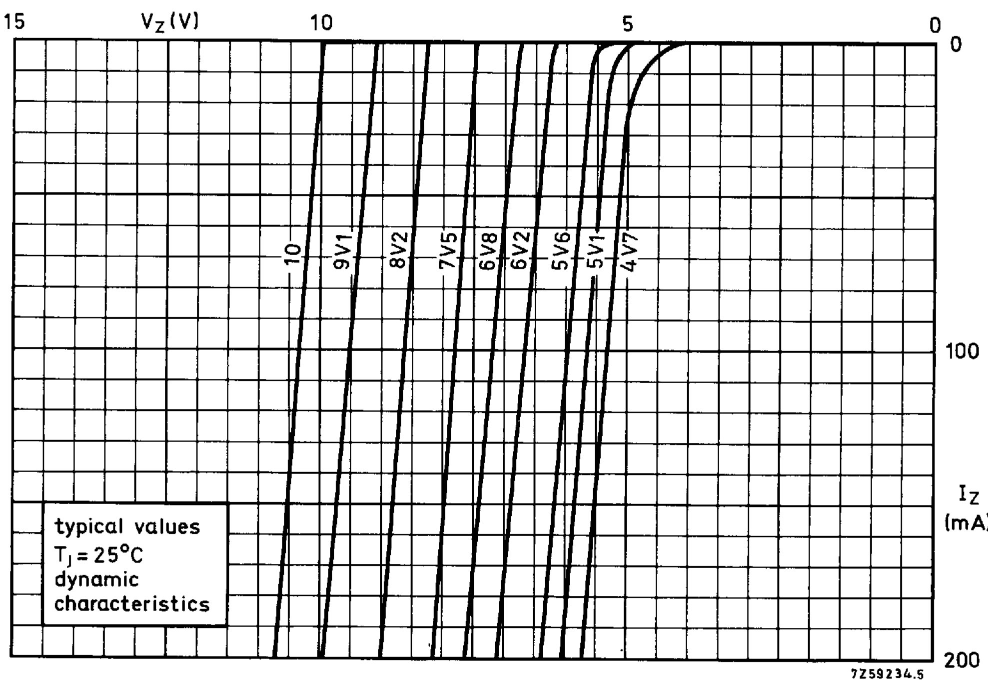


Fig. 3 Dynamic characteristics; typical values at T_j = 25 °C.

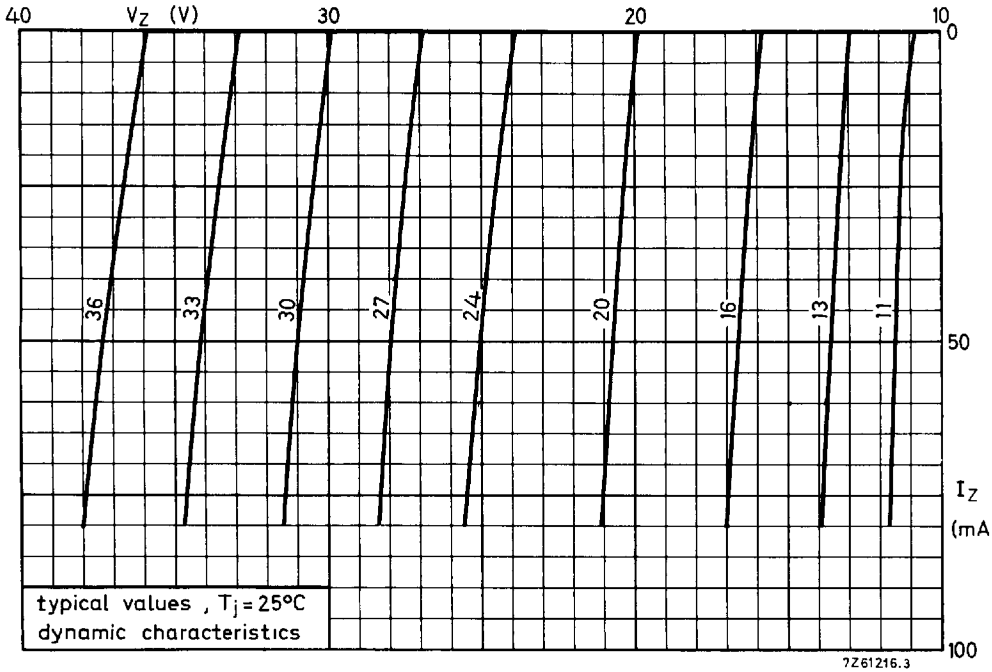


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

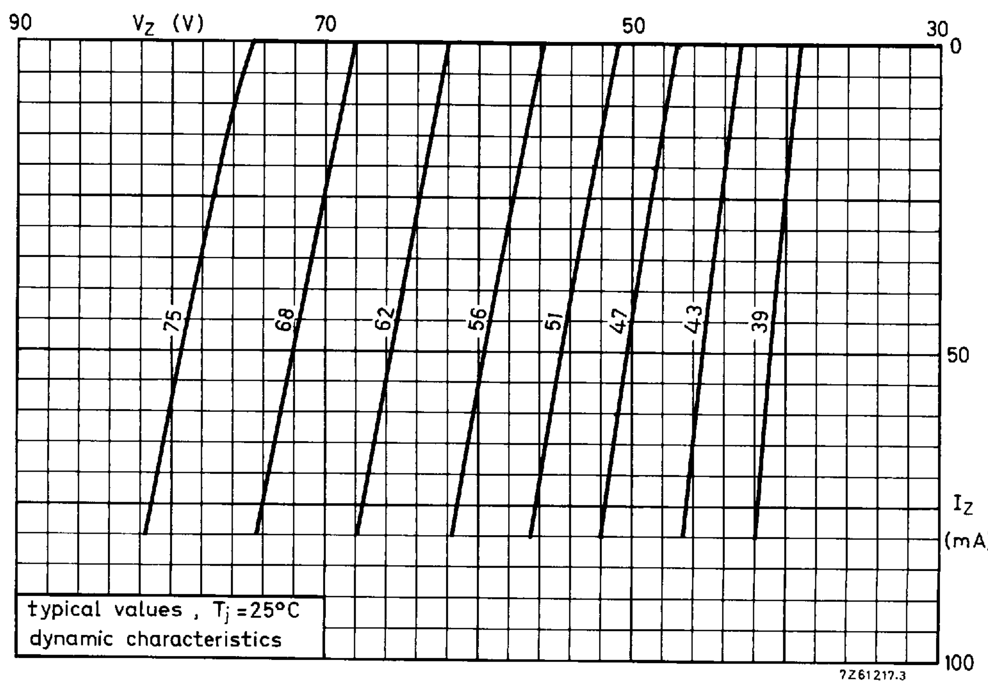


Fig. 5 Dynamic characteristics; typical values at T_j = 25 °C.

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

BZV90-C24 mounted on an epoxy printed circuit board of 40 mm x 40 mm x 1.5 mm; at I_Z = 7 mA.

$V_{Z\ stat}$ = 24 + (0.007 x 24 x 0.095 x 20.4)
= 24 + 0.32 = 24.32 V

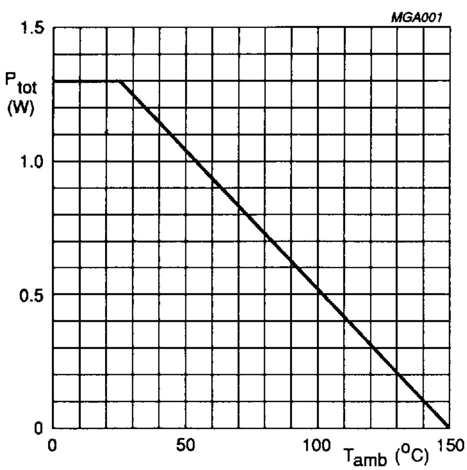


Fig. 6 Power derating curve.

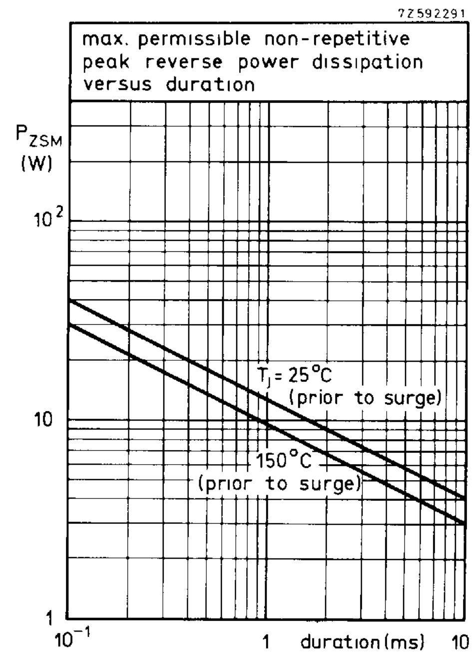


Fig. 7.

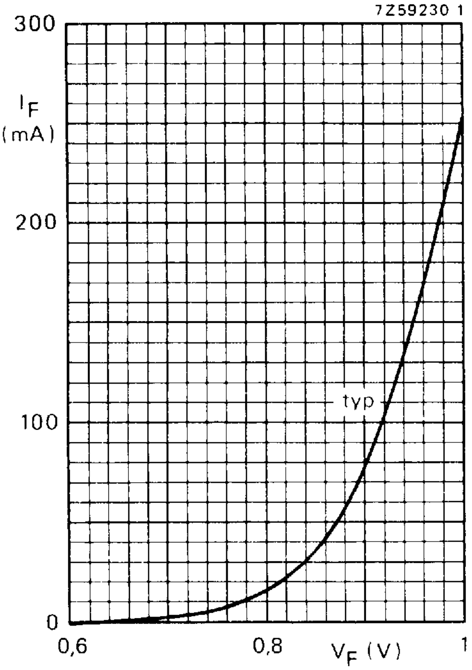


Fig. 8 T_j = 25 °C.

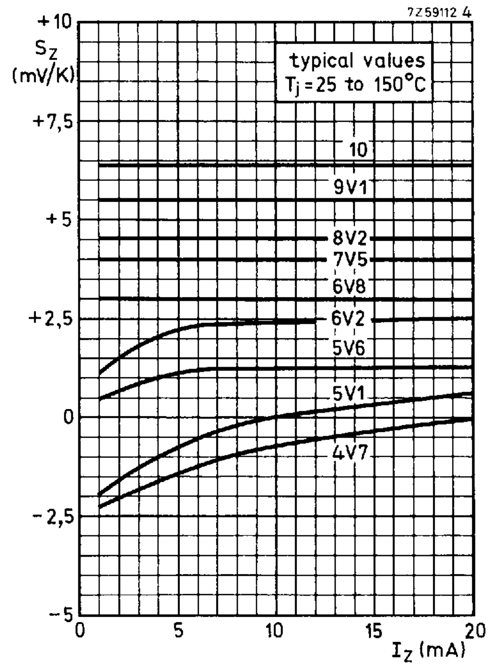


Fig. 9.

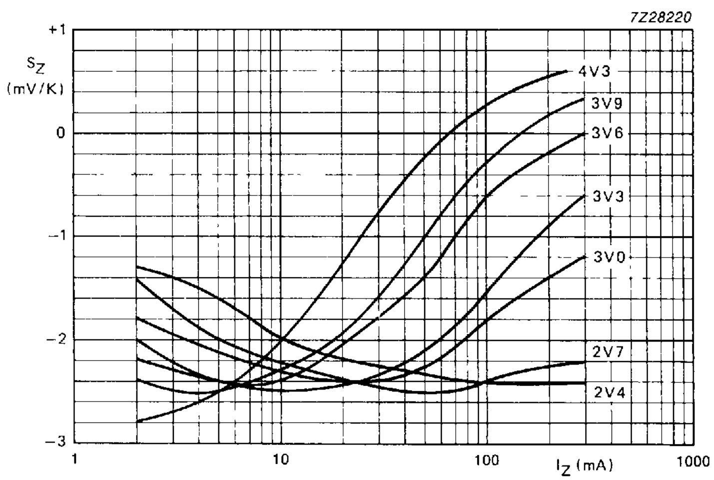


Fig. 10 Typical values temperature coefficient.

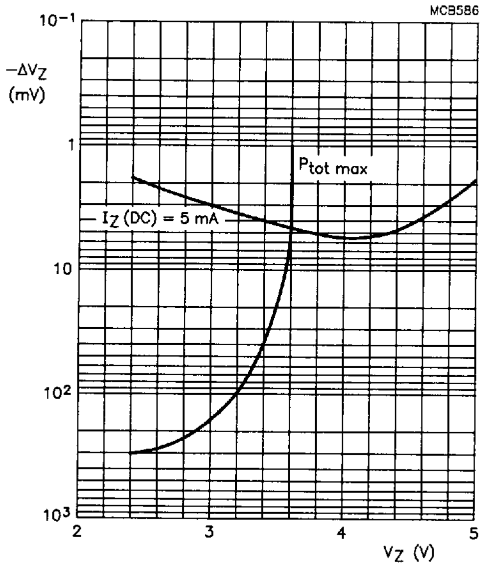


Fig. 11 Typical change of working voltage; $T_j = 25\ ^{o}C$.

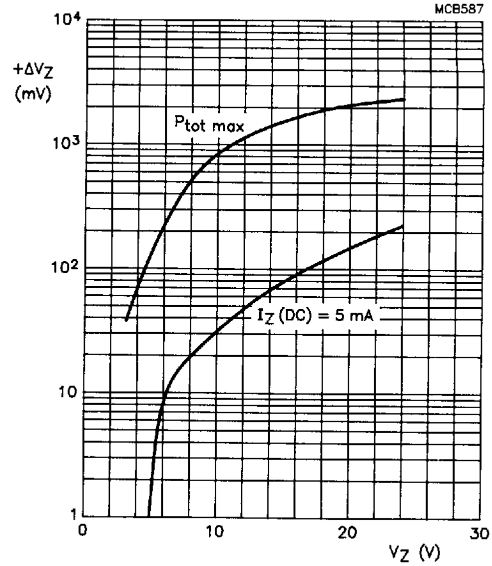


Fig. 12 Typical change of working voltage; $T_j = 25\ ^{o}C$.

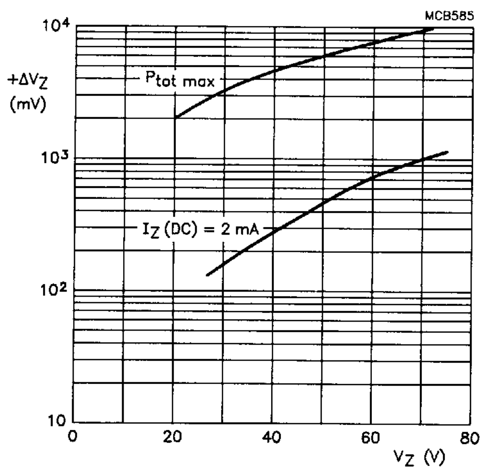


Fig. 13 Typical change of working voltage; $T_j = 25\ ^{o}C$.

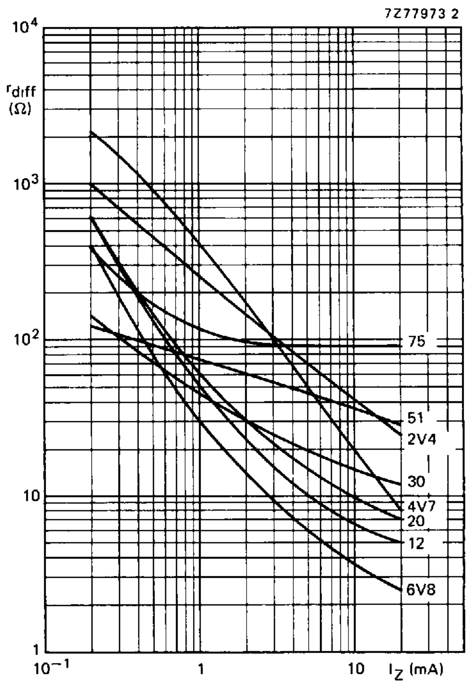


Fig. 14 Typical values; T_j = 25 °C; f = 1 kHz.