Semiconductors

Book S1 1984

Small signal diodes

Voltage regulator diodes

Voltage reference diodes

Tuner diodes

Rectifier diodes

DIODES

DATA HANDBOOK SYSTEM

Our Data Handbook System comprises more than 60 books with specifications on electronic components, subassemblies and materials. It is made up of four series of handbooks:

ELECTRON TUBES	BLUE
SEMICONDUCTORS	RED
INTEGRATED CIRCUITS	PURPLE
COMPONENTS AND MATERIALS	GREEN

The contents of each series are listed on pages iv to viii.

The data handbooks contain all pertinent data available at the time of publication, and each is revised and reissued periodically.

When ratings or specifications differ from those published in the preceding edition they are indicated with arrows in the page margin. Where application information is given it is advisory and does not form part of the product specification.

Condensed data on the preferred products of Philips Electronic Components and Materials Division is given in our Preferred Type Range catalogue (issued annually).

Information on current Data Handbooks and on how to obtain a subscription for future issues is available from any of the Organizations listed on the back cover.
Product specialists are at your service and enquiries will be answered promptly.

ELECTRON TUBES (BLUE SERIES)

The blue series of data handbooks comprises:

T1 **Tubes for r.f. heating**

T2a **Transmitting tubes for communications, glass types**

T2b **Transmitting tubes for communications, ceramic types**

T3 **Klystrons, travelling-wave tubes, microwave diodes**

ET3 **Special Quality tubes, miscellaneous devices** (will not be reprinted)

T4 **Magnetrons**

T5 **Cathode-ray tubes**
Instrument tubes, monitor and display tubes, C.R. tubes for special applications

T6 **Geiger-Müller tubes**

T7 **Gas-filled tubes**
Segment indicator tubes, indicator tubes, dry reed contact units, thyratrons, industrial rectifying tubes, ignitrons, high-voltage rectifying tubes, associated accessories

T8 **Picture tubes and components**
Colour TV picture tubes, black and white TV picture tubes, colour monitor tubes for data graphic display, monochrome monitor tubes for data graphic display, components for colour television, components for black and white television and monochrome data graphic display

T9 **Photo and electron multipliers**
Photomultiplier tubes, phototubes, single channel electron multipliers, channel electron multiplier plates

T10 **Camera tubes and accessories**

T11 **Microwave semiconductors and components**

T12 **Vidicons and Newvicons**

T13 **Image intensifiers**

T14 **Infrared detectors**

T15 **Dry reed switches**

(T12–T15:) Data collations on these subjects are available now. Data Handbooks will be published in 1985.

T16 **Monochrome tubes and deflection units**
Black and white TV picture tubes, monochrome data graphic display tubes, deflection units

SEMICONDUCTORS (RED SERIES)

The red series of data handbooks comprises:

INTEGRATED CIRCUITS (PURPLE SERIES)

The purple series of data handbooks comprises:

EXISTING SERIES

IC1 **Bipolar ICs for radio and audio equipment**

IC2 **Bipolar ICs for video equipment**

IC3 **ICs for digital systems in radio, audio and video equipment**

IC4 **Digital integrated circuits**
CMOS HE4000B family

IC5 **Digital integrated circuits – ECL**
ECL10 000 (GX family), ECL100 000 (HX family), dedicated designs

IC6 **Professional analogue integrated circuits**

IC7 **Signetics bipolar memories**

IC8 **Signetics analogue circuits**

IC9 **Signetics TTL logic**

IC10 **Signetics Integrated Fuse Logic (IFL)**

IC11 **Microprocessors, microcomputers and peripheral circuitry**

NEW SERIES

IC01N	**Radio, audio and associated systems** Bipolar, MOS	
IC02N	**Video and associated systems** Bipolar, MOS	
IC03N	**Telephony equipment** Bipolar, MOS	
IC04N	**HE4000B logic family** CMOS	
IC05N	**HE4000B logic family uncased integrated circuits** CMOS	(published 1984)
IC06N	**PC54/74HC/HCU/HCT logic families** HCMOS	
IC07N	**PC54/74HC/HCU/HCT uncased integrated circuits** HCMOS	
IC08N	**10K and 100K logic family** ECL	(published 1984)
IC09N	**Logic series** TTL	(published 1984)
IC10N	**Memories** MOS, TTL, ECL	
IC11N	**Analogue - industrial**	
IC12N	**Semi-custom gate arrays & cell libraries** ISL, ECL, CMOS	
IC13N	**Semi-custom integrated fuse logic** IFL series 20/24/28	
IC14N	**Microprocessors, microcontrollers & peripherals** Bipolar, MOS	
IC15N	**Logic series** FAST TTL	(published 1984)

Note

Books available in the new series are shown with their date of publication.

COMPONENTS AND MATERIALS (GREEN SERIES)

The green series of data handbooks comprises:

C1 **Assemblies for industrial use**
PLC modules, PC20 modules, HNIL FZ/30 series, NORbits 60-, 61-, 90-series, input devices, hybrid ICs

C2 **Television tuners, video modulators, surface acoustic wave filters**

C3 **Loudspeakers**

C4 **Ferroxcube potcores, square cores and cross cores**

C5 **Ferroxcube for power, audio/video and accelerators**

C6 **Synchronous motors and gearboxes**

C7 **Variable capacitors**

C8 **Variable mains transformers**

C9 **Piezoelectric quartz devices**
Quartz crystal units, temperature compensated crystal oscillators, compact integrated oscillators, quartz crystal cuts for temperature measurements

C10 **Connectors**

C11 **Non-linear resistors**
Voltage dependent resistors (VDR), light dependent resistors (LDR), negative temperature coefficient thermistors (NTC), positive temperature coefficient thermistors (PTC)

C12 **Variable resistors and test switches**

C13 **Fixed resistors**

C14 **Electrolytic and solid capacitors**

C15 **Film capacitors, ceramic capacitors**

C16 **Permanent magnet materials**

C17 **Stepping motors and associated electronics**

C18 **D.C. motors**

C19 **Piezoelectric ceramics**

C20 **Wire-wound components for TVs and monitors**

SMALL-SIGNAL DIODES

General purpose and high-speed switching

type	case	V_R V	I_F mA	I_{FRM} mA	t_{rr} ns	C_d (1) pF	V_F V	at I_F mA	page
BA220	DO-35	10 (2)	200	400	4	2,5	0,95	100	49
BA316	DO-35	10	100	225	4	2	1,1	100	71
BAX14	DO-35	20	500	2000	50	35	1,0	300	229
BA221	DO-35	30	200	400	4	2,5	1,05	200	53
BA317	DO-35	30	100	225	4	2	1,1	100	71
BAS15	DO-34	50	100	225	4	2	1,1	100	99
BA318	DO-35	50	100	225	4	2	1,1	100	71
1N4150	DO-35	50	300	600	6	2,5	1,0	200	583
1N4151	DO-35	50	200	450	2	2	1,0	50	583
1N4153	DO-35	50	200	450	2	2	0,88	20	583
BAV18	DO-35	50	250	625	50	5	1,25	200	179
BAV100	SOD-80	50	250	625	50	1,5	1,25	200	203
BAS56*	SOT-143	60	200	600	6	2,5	1,25	500	139
BAV10	DO-35	60	300	600	6	2,5	1,25	500	171
BAV70*	SOT-23	70	250	250	6	1,5	1,25	150	195
BAV99*	SOT-23	70	250	250	6	1,5	1,25	150	199
BAW56*	SOT-23	70	250	250	6	2	1,25	150	211
1N914	DO-35	75	75	225	4	4	1,0	10	571
1N916	DO-35	75	75	225	4	2	1,0	10	571
1N4148	DO-35	75	200	450	4	4	1,0	10	579
1N4446	DO-35	75	200	450	4	4	1,0	20	579
1N4448	DO-35	75	200	450	4	4	1,0	100	579
1N4531	DO-34	75	200	450	4	4	1,0	10	587
1N4532	DO-34	75	200	450	2	2	1,0	10	587
BAW62	DO-35	75	200	450	4	2	1,0	100	215
BAS32	SOD-80	75	200	450	4	2	1,0	100	125
BAS28*	SOT-143	75	250	250	6	2	1,0	50	119
BAS16	SOT-23	75	250	250	6	2	1,25	150	103
BAX18	DO-35	75	500	2000	–	35	1,0	300	235
BAX12	DO-35	90	400	800	50	35	1,25	400	223
BAS29	SOT-23	90	250	600	50	35	1,25	400	123
BAS31*	SOT-23	90	250	600	50	35	1,25	400	123
BAS35*	SOT-23	90	250	600	50	35	1,25	400	133
BAV19	DO-35	100	250	625	50	5	1,25	200	179
BAV101	SOD-80	100	250	625	50	5	1,25	200	203
BAV102	SOD-80	150	250	625	50	5	1,25	200	203
BAV20	DO-35	150	250	625	50	5	1,25	200	179
BAV23*	SOT-143	200	200	625	50	5	1,25	200	187
BAV21	DO-35	200	250	625	50	5	1,25	200	179
BAV103	SOD-80	200	250	625	50	5	1,25	200	203
BAS11	DO-35	300	350	2000	1000	15	1,1	300	93

(1) At V_R = 0 V and f = 1 MHz. (2) V_{RRM}.
* Double diode.
All maximum values.

TUNER DIODES

Variable capacitance diodes

type	case	V_R V	I_F mA	C_d pF	at V_R V	C_d ratio	at V_R .V/..V	page
AFC								
BB417	DO-34	20	20	8-11	4	2-5	4/15	263
BB119	DO-35	15	200	20-25	4	> 1,3	4/10	245
FM radio								
BB204G*	TO-92	30	100	34-39	3	2,5-2,8	3/30	251
BB204B*	TO-92	30	100	37-42	3	2,5-2,8	3/30	251
AM radio								
BB112	SOD-69	12	50	440-540	1	> 18	1/9	243
BB130	SOD-69	30	50	450-550	1	> 23	1/28	249
BB212*	TO-92	12	100	500-620	0,5	> 22,5	0,5/8	255
VHF television								
BB809	DO-34	28	20	30-46	1	8-10	1/28	265
BB909A	DO-34	32	20	> 31	1	12-15	1/28	269
BB909B	DO-34	32	20	> 33,5	1	12-15	1/28	269
UHF television								
BB405B	DO-34	28	20	> 15,5	1	4,8-5,8	3/25	259
Varicaps for surface mounting								
BBY31	SOT-23	28	20	typ. 17,5	1	typ. 5	3/25	273
BBY40	SOT-23	28	20	26-32	3	5,0-6,5	3/25	277

* Double diode.

Band switching diodes

type	case	V_R V	I_F mA	C_d pF	at V_R V	r_D Ω	at I_F mA	and f MHz	page
AM radio									
BA223	DO-34	20	50	< 3,5	6	< 1,5	10	1	57
BA423	DO-34	20	50	< 2,5	3	< 1,2	10	1	79
VHF television									
BA482	DO-34	35	100	< 1,2	3	< 0,7	3	200	87
BA483	DO-34	35	100	< 1,0	3	< 1,2	3	200	87
BA484	DO-34	35	100	< 1,6	3	< 1,2	3	200	87
BAT18	SOT-23	35	100	< 1,0	20	< 0,7	5	200	147

UHF mixer Schottky-barrier diode

type	case	V_R V	I_F mA	C_d pF	at V_R V	V_F mV	at I_F mA	page
BA480	DO-34	4	30	< 1,2	0,2	280	1	83
BA481	DO-34	4	30	< 1,1	0	450	1	85

FM detector diode

type	case	V_R V	I_F mA	C_d pF	at V_R V	and f MHz	V_F at I_F = 10 μA mV	page
BA281	DO-35	50	200	1,2	0	1	360-420	61

Low leakage diodes

type	case	V_R V	I_R at V_R pA	C_d at $V_R = 0$ and f = 1 MHz pF	page
BAS45	DO-34	125	1000	8	135
BAV45	TO-18	20	10	1,3	189

SCHOTTKY BARRIER SWITCHING DIODES

type	case	V_R V	I_F mA	C_d pF	at V_R V	t_{rr} ns	V_F mV	at I_F mA	page
BAT17	SOT23	4	30	< 10	0	–	< 450	1	143
BYV10-20	DO-41	20	1000	220	0	–	< 390	100	381
BYV10-30	DO-41	30	1000	220	0	–	< 390	100	381
BYV10-40	DO-41	40	1000	220	0	–	< 390	100	381
BAT54	SOT-23	30	200	< 1,0	1	5	< 320	1	151
BAT74*	SOT-143	30	200	< 1,0	1	5	< 320	1	155
BAT81	DO-34	40	30	< 1,6	1	1	< 410	1	159
BAT82	DO-34	50	30	< 1,6	1	1	< 410	1	159
BAT83	DO-34	60	30	< 1,6	1	1	< 410	1	159
BAT85	DO-34	30	200	< 10	1	5	< 320	1	163
BAT86	DO-34	50	200	< 8	1	4	< 380	1	167

* Double diode.

VOLTAGE REFERENCE DIODES

type	case	ref. volt. min. V	nom. V	max. V	at I_Z mA	I_{ZM} (I_{ZRM}) mA	$\|S_Z\|$ %/K	at I_Z mA	r_{diff} max. Ω	at I_Z mA	page
BZX90	DO-34	6,2	6,5	6,8	7,5	50	< 0,01	7,5	15	7,5	559
BZX91							< 0,005				559
BZX92							< 0,002				559
BZX93							< 0,001				559
BZX94							< 0,0005				559
1N821;A	DO-34	5,89	6,2	6,51	7,5	50	< 0,01	7,5	15 (10)	7,5	565
1N823;A							< 0,005		(A-version)		565
1N825;A							< 0,002				565
1N827;A							< 0,001				565
1N829;A							< 0,0005				565
BZV10	DO-34	6,17	6,5	6,82	2,0	50	< 0,01	2,0	50	2,0	467
BZV11							< 0,005				467
BZV12							< 0,002				467
BZV13							< 0,001				467
BZV14							< 0,0005				467

TRANSIENT SUPPRESSOR DIODES

type	case	V_R V	$V_{(CL)R}$ V	I_{RSM} A	P_{RSM} W	page
BZW14	SOD-64	12	28	50	–	521
BZT03 series	SOD-57	6,2 to 220	11,3 to 380	26,5 to 0,8	600	461
BZW03 series	SOD-64	6,2 to 220	11,3 to 380	44,2 to 1,3	1000	515

VOLTAGE REGULATOR DIODES

Stabistors (used in forward direction)

type	case	typical V_F at I_F = 1 mA (V)	typical V_F at I_F = 5 mA (V)	typical V_F at I_F = 10 mA (V)	V_R V_{RRM} (V)	I_{FRM} (mA)	S_F typ. (mV/K)	at I_F (mA)	r_{diff} max. (Ω)	at I_F (mA)	page
BAX14	DO-35	0,55	0,62	0,65	40	2000	−2,2	1	6	10	229
BA220	DO-35	0,58	0,66	0,70	10	400	−2,2	1	7	10	49
BA315	DO-35	0,62	0,70	0,75	5	225	−2,1	1	7	10	67
BA314	DO-35	0,72	0,77	0,79	4	250	−1,8	1	6	10	63
BAS17	SOT-23	0,72	0,77	0,79	4	250	−1,8	1	—		107
BZV46-1V5	DO-35	1,35	1,45	1,50	4	120	−3,65	5	20	5	475
BZV46-2V0	DO-35	2,00	2,15	2,20	4	80	−5,6	5	30	5	475

Voltage regulators (for high-power voltage regulators see Handbook Power diodes)

type	case	working voltage E24 range (V)	working voltage tol. (%)	I_{FRM} (mA)	P_{tot} (W)	at T_{tp} (T_{amb}) (°C)	P_{ZSM} at T_j = 25 °C, t_p = 100 μs (W)	page
BZV37	DO-34	6,5	5	—	0,4	(50)	40	471
BZV49 series	SOT-89	2,4 to 75	5	250	1	(25)	40	479
BZX55 series	DO-35	2,4 to 75	5	250	0,5	50	40	525
BZX79 series	DO-35	2,4 to 75	2 or 5	250	0,5	50	40	533
BZX84 series	SOT-23	2,7 to 75	5	250	0,35	(25)	—	549
BZV55 series	SOD-80	2,4 to 75	5	250	0,5	(50)	30 (T_j = 150 °C)	489
BZV85 series	DO-41	3,6 to 75	5	250	1,3	55	60	503
BZD23 series	SOD-81	3,9 to 270	5	—	2,5	25	300	459
BZT03 series	SOD-57	7,5 to 270	5	—	3,25	25	600	461
BZW03 series	SOD-64	7,5 to 270	5	—	6	25	1000	515

RECTIFIER DIODES

Efficiency diodes

type	case	$I_{F(AV)}$ A	I_{FWM} A	V_{RRM} V	I_{FRM} A	t_d µs	t_{tot} µs	V_F V	at I_F A	page
BY588	SOD-57	1,5	–	50	10	> 0,7	–	1,6	3	331
BY448	SOD-57	–	4	1500	8	–	20	1,6	3	361
BY458	SOD-57	–	4	1200	8	–	20	1,6	3	301
BY228	SOD-64	–	5	1500	10	–	20	1,5	5	293
BY438	SOD-64	–	5	1200	10	–	20	1,5	5	297

Controlled avalanche

type	case	$I_{F(AV)}$ A	I_{FWM} A	V_{RRM} V	I_{FRM} A	t_d µs	t_{tot} µs	V_F V	at I_F A	page
BYD13D	SOD-81	1,4	200	200	5,5	20	400	1,05	1	359
BYD13G	SOD-81	1,4	400	400	5,5	20	400	1,05	1	359
BYD13J	SOD-81	1,4	600	600	5,5	20	400	1,05	1	359
BYD13K	SOD-81	1,4	800	800	5,5	20	400	1,05	1	359
BYD13M	SOD-81	1,4	1000	1000	5,5	20	400	1,05	1	359
BY527	SOD-57	2,0	1250	800	12	50	1000	1,65	10	317
BYW54	SOD-57	2,0	600	600	12	50	1000	1,65	10	429
BYW55	SOD-57	2,0	800	800	12	50	1000	1,65	10	429
BYW56	SOD-57	2,0	1000	1000	12	50	1000	1,65	10	429
1N5059	SOD-57	2,0	200	200	12	50	1000	1,15	2,5	591
1N5060	SOD-57	2,0	400	400	12	50	1000	1,15	2,5	591
1N5061	SOD-57	2,0	600	600	12	50	1000	1,15	2,5	591
1N5062	SOD-57	2,0	800	800	12	50	1000	1,15	2,5	591
BYM56A	SOD-64	3,5	200	200	20	80	1000	1,25	5	375
BYM56B	SOD-64	3,5	400	400	20	80	1000	1,25	5	375
BYM56C	SOD-64	3,5	600	600	20	80	1000	1,25	5	375
BYM56D	SOD-64	3,5	800	800	20	80	1000	1,25	5	375
BYM56E	SOD-64	3,5	1000	1000	20	80	1000	1,25	5	375

Avalanche fast soft-recovery

type	case	$I_{F(AV)}$ A	V_{RRM} V	V_R V	I_{FRM} A	I_{FSM} A	t_{rr} ns	V_F V	at I_F A	page
BYD33D	SOD-81	1,3	200	200	12	20	250	1,3	1	365
BYD33G	SOD-81	1,3	400	400	12	20	250	1,3	1	365
BYD33J	SOD-81	1,3	600	600	12	20	250	1,3	1	365
BYV95A	SOD-57	1,5	200	200	10	35	250	1,6	3	413
BYV95B	SOD-57	1,5	400	400	10	35	250	1,6	3	413
BYV95C	SOD-57	1,5	600	600	10	35	250	1,6	3	413
BYV96D	SOD-57	1,5	800	800	10	35	300	1,6	3	421
BYV96E	SOD-57	1,5	1000	1000	10	35	300	1,6	3	421
BYW95A	SOD-64	3,0	200	200	15	70	250	1,5	5	437
BYW95B	SOD-64	3,0	400	400	15	70	250	1,5	5	437
BYW95C	SOD-64	3,0	600	600	15	70	250	1,5	5	437
BYW96D	SOD-64	3,0	800	800	15	70	300	1,5	5	445
BYW96E	SOD-64	3,0	1000	1000	15	70	300	1,5	5	445

All values are maximum.

Very fast recovery (epitaxial avalanche)

type	case	$I_{F(AV)}$ A	V_{RRM} V	V_R V	I_{FRM} A	I_{FSM} A	t_{rr} ns	V_F at V	I_F A	page
BYV26A	SOD-57	1,0	200	200	10	20	30	2,5	1	383
BYV26B	SOD-57	1,0	400	400	10	20	30	2,5	1	383
BYV26C	SOD-57	1,0	600	600	10	20	30	2,5	1	383
BYV26D	SOD-57	1,0	800	800	10	20	75	2,5	1	383
BYV26E	SOD-57	1,0	1000	1000	10	20	75	2,5	1	383
BYV36A	SOD-57	1,6	200	200	10	30	100	1,35	1	403
BYV36B	SOD-57	1,6	400	400	10	30	100	1,35	1	403
BYV36C	SOD-57	1,6	600	600	10	30	100	1,35	1	403
BYV36D	SOD-57	1,5	800	800	9	30	150	1,45	1	403
BYV36E	SOD-57	1,5	1000	1000	9	30	150	1,45	1	403
BYD73A	SOD-81	1,75	50	50	15	25	25	0,95	1	371
BYD73B	SOD-81	1,75	100	100	15	25	25	0,95	1	371
BYD73C	SOD-81	1,75	150	150	15	25	25	0,95	1	371
BYD73D	SOD-81	1,75	200	200	15	25	25	0,95	1	371
BYD73E	SOD-81	1,7	250	250	13	25	50	1,05	1	371
BYD73F	SOD-81	1,7	300	300	13	25	50	1,05	1	371
BYD73G	SOD-81	1,7	400	400	13	25	50	1,05	1	371
BYV27-50	SOD-57	2,0	50	50	15	50	25	1,07	3	389
BYV27-100	SOD-57	2,0	100	100	15	50	25	1,07	3	389
BYV27-150	SOD-57	2,0	150	150	15	50	25	1,07	3	389
BYV27-200	SOD-57	2,0	200	200	15	50	25	1,07	3	389
BYV28-50	SOD-64	3,5	50	50	25	90	30	1,1	5	397
BYV28-100	SOD-64	3,5	100	100	25	90	30	1,1	5	397
BYV28-150	SOD-64	3,5	150	150	25	90	30	1,1	5	397
BYV28-200	SOD-64	3,5	200	200	25	90	30	1,1	5	397

E.H.T. soft recovery

type	case	$I_{F(AV)}$ mA	V_{RRM} kV	V_{RW} kV	page
BY584	SOD-61	85	1,8	1,5	325
BY505	SOD-61	85	2,2	2,0	309
BY614	SOD-61	50	2,2	2,0	339
BYX90G	SOD-83	550	7,5	6	453
BY707	SOD-61	4	9	8	347
BY708	SOD-61	4	12	10	347
BY709	SOD-61	5	14	12	347
BY609	SOD-61	4	15	12	335
BY610	SOD-61	4	17	12	335
BY619	SOD-61	4	15	12	343
BY620	SOD-61	4	17	12	343
BY710	SOD-61	3	17	14	351
BY711	SOD-61	3	19	16	351
BY712	SOD-61	3	22	18	355
BY713	SOD-61	3	24	20	355
BY714	SOD-61	3	30	24	355

All values are maximum.

HIGH VOLTAGE TRIPLER UNITS

type	$V_{i(p-p)}$ kV	V_{OM} kV	I_O mA	$I_{i(D6)}$ mA	R_i kΩ typ.	C_i pF typ.	page
BG2000-541-004	10	27,5	1,7	4	500	10	281
BG2097-641	10	27,5	1,7	4	500	10	287
BG2097-642	10	27,5	1,7	4	500	10	287

* Series.

PRO ELECTRON TYPE DESIGNATION CODE FOR SEMICONDUCTOR DEVICES

This type designation code applies to discrete semiconductor devices – as opposed to integrated circuits –, multiples of such devices and semiconductor chips.

"Although not all type numbers accord with the Pro Electron system, the following explanation is given for the ones that do."

A basic type number consists of:

TWO LETTERS FOLLOWED BY A SERIAL NUMBER

FIRST LETTER

The first letter gives information about the material used for the active part of the devices.

A. GERMANIUM or other material with band gap of 0,6 to 1,0 eV.
B. SILICON or other material with band gap of 1,0 to 1,3 eV.
C. GALLIUM-ARSENIDE or other material with band gap of 1,3 eV or more.
R. COMPOUND MATERIALS (e.g. Cadmium-Sulphide).

SECOND LETTER

The second letter indicates the function for which the device is primarily designed.

A. DIODE; signal, low power
B. DIODE; variable capacitance
C. TRANSISTOR; low power, audio frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
D. TRANSISTOR; power, audio frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
E. DIODE; tunnel
F. TRANSISTOR; low power, high frequency ($R_{th\ j\text{-}mb} > 15$ K/W)
G. MULTIPLE OF DISSIMILAR DEVICES – MISCELLANEOUS; e.g. oscillator
H. DIODE; magnetic sensitive
L. TRANSISTOR; power, high frequency ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
N. PHOTO-COUPLER
P. RADIATION DETECTOR; e.g. high sensitivity phototransistor
Q. RADIATION GENERATOR; e.g. light-emitting diode (LED)
R. CONTROL AND SWITCHING DEVICE; e.g. thyristor, low power ($R_{th\ j\text{-}mb} > 15$ K/W)
S. TRANSISTOR; low power, switching ($R_{th\ j\text{-}mb} > 15$ K/W)
T. CONTROL AND SWITCHING DEVICE; e.g. thyristor, power ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
U. TRANSISTOR; power, switching ($R_{th\ j\text{-}mb} \leqslant 15$ K/W)
X. DIODE: multiplier, e.g. varactor, step recovery
Y. DIODE; rectifying, booster
Z. DIODE; voltage reference or regulator (transient suppressor diode, with third letter **W**)

SERIAL NUMBER

Three figures, running from 100 to 999, for devices primarily intended for consumer equipment.*
One letter (Z, Y, X, etc.) and two figures, running from 10 to 99, for devices primarily intended for industrial/professional equipment.*
This letter has no fixed meaning except W, which is used for transient suppressor diodes.

VERSION LETTER

It indicates a minor variant of the basic type either electrically or mechanically. The letter never has a fixed meaning, except letter R, indicating reverse voltage, e.g. collector to case or anode to stud.

SUFFIX

Sub-classification can be used for devices supplied in a wide range of variants called associated types. Following sub-coding suffixes are in use:

1. VOLTAGE REFERENCE and VOLTAGE REGULATOR DIODES: *ONE LETTER and ONE NUMBER*
   The LETTER indicates the nominal tolerance of the Zener (regulation, working or reference) voltage
   A. 1% (according to IEC 63: series E96)
   B. 2% (according to IEC 63: series E48)
   C. 5% (according to IEC 63: series E24)
   D. 10% (according to IEC 63: series E12)
   E. 20% (according to IEC 63: series E6)
   The number denotes the typical operating (Zener) voltage related to the nominal current.rating for the whole range.
   The letter 'V' is used instead of the decimal point.

2. TRANSIENT SUPPRESSOR DIODES: *ONE NUMBER*
   The NUMBER indicates the maximum recommended continuous reversed (stand-off) voltage V_R. The letter 'V' is used as above.

3. CONVENTIONAL and CONTROLLED AVALANCHE RECTIFIER DIODES and THYRISTORS: *ONE NUMBER*
   The NUMBER indicates the rated maximum repetitive peak reverse voltage (V_{RRM}) or the rated repetitive peak off-state voltage (V_{DRM}), whichever is the lower. Reversed polarity is indicated by letter R, immediately after the number.

4. RADIATION DETECTORS: *ONE NUMBER,* preceded by a hyphen (–)
   The NUMBER indicates the depletion layer in μm. The resolution is indicated by a version LETTER.

5. ARRAY OF RADIATION DETECTORS and GENERATORS: *ONE NUMBER,* preceded by a stroke (/).
   The NUMBER indicates how many basic devices are assembled into the array.

* When these serial numbers are exhausted the serial number for consumer types may be extended to four figures, and that for industrial types to three figures.

RATING SYSTEMS

The rating systems described are those recommended by the International Electrotechnical Commission (IEC) in its Publication 134.

DEFINITIONS OF TERMS USED

Electronic device. An electronic tube or valve, transistor or other semiconductor device.

Note
This definition excludes inductors, capacitors, resistors and similar components.

Characteristic. A characteristic is an inherent and measurable property of a device. Such a property may be electrical, mechanical, thermal, hydraulic, electro-magnetic, or nuclear, and can be expressed as a value for stated or recognized conditions. A characteristic may also be a set of related values, usually shown in graphical form.

Bogey electronic device. An electronic device whose characteristics have the published nominal values for the type. A bogey electronic device for any particular application can be obtained by considering only those characteristics which are directly related to the application.

Rating. A value which establishes either a limiting capability or a limiting condition for an electronic device. It is determined for specified values of environment and operation, and may be stated in any suitable terms.

Note
Limiting conditions may be either maxima or minima.

Rating system. The set of principles upon which ratings are established and which determine their interpretation.

Note
The rating system indicates the division of responsibility between the device manufacturer and the circuit designer, with the object of ensuring that the working conditions do not exceed the ratings.

ABSOLUTE MAXIMUM RATING SYSTEM

Absolute maximum ratings are limiting values of operating and environmental conditions applicable to any electronic device of a specified type as defined by its published data, which should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking no responsibility for equipment variations, environmental variations, and the effects of changes in operating conditions due to variations in the characteristics of the device under consideration and of all other electronic devices in the equipment.

The equipment manufacturer should design so that, initially and throughout life, no absolute maximum value for the intended service is exceeded with any device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, equipment control adjustment, load variations, signal variation, environmental conditions, and variations in characteristics of the device under consideration and of all other electronic devices in the equipment.

DESIGN MAXIMUM RATING SYSTEM

Design maximum ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under the worst probable conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device, taking responsibility for the effects of changes in operating conditions due to variations in the characteristics of the electronic device under consideration.

The equipment manufacturer should design so that, initially and throughout life, no design maximum value for the intended service is exceeded with a bogey device under the worst probable operating conditions with respect to supply voltage variation, equipment component variation, variation in characteristics of all other devices in the equipment, equipment control adjustment, load variation, signal variation and environmental conditions.

DESIGN CENTRE RATING SYSTEM

Design centre ratings are limiting values of operating and environmental conditions applicable to a bogey electronic device of a specified type as defined by its published data, and should not be exceeded under normal conditions.

These values are chosen by the device manufacturer to provide acceptable serviceability of the device in average applications, taking responsibility for normal changes in operating conditions due to rated supply voltage variation, equipment component variation, equipment control adjustment, load variation, signal variation, environmental conditions, and variations in the characteristics of all electronic devices.

The equipment manufacturer should design so that, initially, no design centre value for the intended service is exceeded with a bogey electronic device in equipment operating at the stated normal supply voltage.

LETTER SYMBOLS FOR TRANSISTORS AND SIGNAL DIODES

based on IEC Publication 148

LETTER SYMBOLS FOR CURRENTS, VOLTAGES AND POWERS

Basic letters

The basic letters to be used are:

I, i = current
V, v = voltage
P, p = power.

Lower-case basic letters shall be used for the representation of instantaneous values which vary with time.
In all other instances upper-case basic letters shall be used.

Subscripts

A, a	Anode terminal
(AV), (av)	Average value
B, b	Base terminal, for MOS devices: Substrate
(BR)	Breakdown
C, c	Collector terminal
D, d	Drain terminal
E, e	Emitter terminal
F, f	Forward
G, g	Gate terminal
K, k	Cathode terminal
M, m	Peak value
O, o	As third subscript: The terminal not mentioned is open circuited
R, r	As first subscript: Reverse. As second subscript: Repetitive. As third subscript: With a specified resistance between the terminal not mentioned and the reference terminal.
(RMS), (rms)	R.M.S. value
S, s	As first or second subscript: Source terminal (for FETS only) As second subscript: Non-repetitive (not for FETS) As third subscript: Short circuit between the terminal not mentioned and the reference terminal
X, x	Specified circuit
Z, z	Replaces R to indicate the actual working voltage, current or power of voltage reference and voltage regulator diodes.

Note: No additional subscript is used for d.c. values.

Upper-case subscripts shall be used for the indication of:

a) continuous (d.c.) values (without signal)

Example I_B

b) instantaneous total values

Example i_B

c) average total values

Example $I_{B(AV)}$

d) peak total values

Example I_{BM}

e) root-mean-square total values

Example $I_{B(RMS)}$

Lower-case subscripts shall be used for the indication of values applying to the varying component alone:

a) instantaneous values

Example i_b

b) root-mean-square values

Example $I_{b(rms)}$

c) peak values

Example I_{bm}

d) average values

Example $I_{b(av)}$

Note: If more than one subscript is used, subscript for which both styles exist shall either be all upper-case or all lower-case.

Additional rules for subscripts

Subscripts for currents

Transistors: If it is necessary to indicate the terminal carrying the current, this should be done by the first subscript (conventional current flow from the external circuit into the terminal is positive).

Examples: I_B, i_B, i_b, I_{bm}

Diodes: To indicate a forward current (conventional current flow into the anode terminal) the subscript F or f should be used; for a reverse current (conventional current flow out of the anode terminal) the subscript R or r should be used.

Examples: I_F, I_R, i_F, $I_{f(rms)}$

Subscripts for voltages

Transistors: If it is necessary to indicate the points between which a voltage is measured, this should be done by the first two subscripts. The first subscript indicates the terminal at which the voltage is measured and the second the reference terminal or the circuit node. Where there is no possibility of confusion, the second subscript may be omitted.

Examples: V_{BE}, v_{BE}, v_{be}, V_{bem}

Diodes: To indicate a forward voltage (anode positive with respect to cathode), the subscript F or f should be used; for a reverse voltage (anode negative with respect to cathode) the subscript R or r should be used.

Examples: V_F, V_R, v_F, V_{rm}

Subscripts for supply voltages or supply currents

Supply voltages or supply currents shall be indicated by repeating the appropriate terminal subscript.

Examples: V_{CC}, I_{EE}

Note: If it is necessary to indicate a reference terminal, this should be done by a third subscript

Example : V_{CCE}

Subscripts for devices having more than one terminal of the same kind

If a device has more than one terminal of the same kind, the subscript is formed by the appropriate letter for the terminal followed by a number; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{B2} = continuous (d.c.) current flowing into the second base terminal

V_{B2-E} = continuous (d.c.) voltage between the terminals of second base and emitter

Subscripts for multiple devices

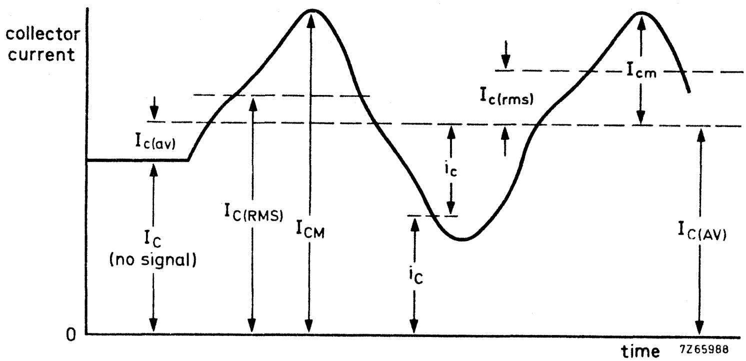
For multiple unit devices, the subscripts are modified by a number preceding the letter subscript; in the case of multiple subscripts, hyphens may be necessary to avoid misunderstanding.

Examples: I_{2C} = continuous (d.c.) current flowing into the collector terminal of the second unit

V_{1C-2C} = continuous (d.c.) voltage between the collector terminals of the first and the second unit.

Application of the rules

The figure below represents a transistor collector current as a function of time. It consists of a continuous (d.c.) current and a varying component.



LETTER SYMBOLS FOR ELECTRICAL PARAMETERS

Definition

For the purpose of this Publication, the term "electrical parameter" applies to four-pole matrix parameters, elements of electrical equivalent circuits, electrical impedances and admittances, inductances and capacitances.

Basic letters

The following is a list of the most important basic letters used for electrical parameters of semiconductor devices.

B, b = susceptance; imaginary part of an admittance

C = capacitance

G, g = conductance; real part of an admittance

H, h = hybrid parameter

L = inductance

R, r = resistance; real part of an impedance

X, x = reactance; imaginary part of an impedance

Y, y = admittance;

Z, z = impedance;

Upper-case letters shall be used for the representation of:

a) electrical parameters of external circuits and of circuits in which the device forms only a part;

b) all inductances and capacitances.

Lower-case letters shall be used for the representation of electrical parameters inherent in the device (with the exception of inductances and capacitances).

Subscripts

General subscripts

The following is a list of the most important general subscripts used for electrical parameters of semiconductor devices:

F, f = forward; forward transfer
I, i (or 1) = input
L, l = load
O, o (or 2) = output
R, r = reverse; reverse transfer
S, s = source

Examples: Z_S, h_f, h_F

The upper-case variant of a subscript shall be used for the designation of static (d.c.) values.

Examples : h_{FE} = static value of forward current transfer ratio in common-emitter configuration (d.c. current gain)

R_E = d.c. value of the external emitter resistance.

Note: The static value is the slope of the line from the origin to the operating point on the appropriate characteristic curve, i.e. the quotient of the appropriate electrical quantities at the operating point.

The lower-case variant of a subscript shall be used for the designation of small-signal values.

Examples: h_{fe} = small-signal value of the short-circuit forward current transfer ratio in common-emitter configuration

$Z_e = R_e + jX_e$ = small-signal value of the external impedance

Note: If more than one subscript is used, subscripts for which both styles exist shall either be all upper-case or all lower-case

Examples: h_{FE}, y_{RE}, h_{fe}

Subscripts for four-pole matrix parameters

The first letter subscript (or double numeric subscript) indicates input, output, forward transfer or reverse transfer

Examples: h_i (or h_{11})
h_o (or h_{22})
h_f (or h_{21})
h_r (or h_{12})

A further subscript is used for the identification of the circuit configuration. When no confusion is possible, this further subscript may be omitted.

Examples: h_{fe} (or h_{21e}), h_{FE} (or h_{21E})

Distinction between real and imaginary parts

If it is necessary to distinguish between real and imaginary parts of electrical parameters, no additional subscripts should be used. If basic symbols for the real and imaginary parts exist, these may be used.

Examples: $Z_i = R_i + jX_i$
$y_{fe} = g_{fe} + jb_{fe}$

If such symbols do not exist or if they are not suitable, the following notation shall be used:

Examples: Re (h_{ib}) etc. for the real part of h_{ib}
Im (h_{ib}) etc. for the imaginary part of h_{ib}

PRO ELECTRON COLOUR CODING SYSTEM FOR PROFESSIONAL SMALL SIGNAL DIODES

Letter combination - background colour

BAV - green
BAW - blue
BAX - black
BAS - orange
BAT - yellow

Figure combination - colour bands

0 - black
1 - brown
2 - red
3 - orange
4 - yellow
5 - green
6 - blue
7 - violet
8 - grey
9 - white

The cathode side is indicated by a broad band which is at the same time the first digit of the figure combination.

Note: For BA types see individual type publications.

JEDEC assigned type numbers

(EIA-standard RS-236-B; June, 1963)

1. Prefix identification

The prefix identification consisting of a first number symbol and the letter "N" shall not be indicated in the coding.

2. Banding systems

The sequence number consisting of a two, three, or four digit number after the letter "N" may be coded as follows:

2.1 Two-digit sequence numbers shall consist of a first black band and the sequence number in second and third bands of the colours indicated in Table 1. If a suffix letter is required, it shall be indicated with a fourth band as indicated in Table 1.

2.2 Three-digit sequence numbers shall consist of the sequence number in first, second, and third bands of the colours indicated in Table 1. If a suffix letter is required, it shall be indicated with a fourth band as indicated in Table 1.

2.3 Four-digit sequence numbers shall consist of the sequence number in four bands of the colours indicated in Table 1.
If a suffix letter is required it shall be indicated as the fifth band.

3. Cathode identification and reading sequence

3.1 A double-width band shall be used as the first band reading from cathode to anode ends.

3.2 An alternative method is provided where equal width bands may be used. The bands shall be clearly grouped toward the cathode end, and shall be read from cathode to anode ends.

3.3 Either of the above colour banding methods may be used in stead of the cathode designating symbol or other marking.

4. Colour bands

The sequence numbers of the type numbers and suffix letters shall be indicated by the colours in Table 1.

TABLE 1

NUMBER	COLOUR	SUFFIX LETTER
0	black	not applicable
1	brown	A
2	red	B
3	orange	C
4	yellow	D
5	green	E
6	blue	F
7	violet	G
8	grey	H
9	white	J

TAPE AND REEL SPECIFICATION

Semiconductors in SOT-23 and SOT-143 encapsulations can be delivered in reel packing for automatic placement on hybrid circuits and printed circuit boards. The devices are placed with the mounting side downwards in compartments.
A separate cross-section for SOD-80 encapsulation is given in Fig. 3.

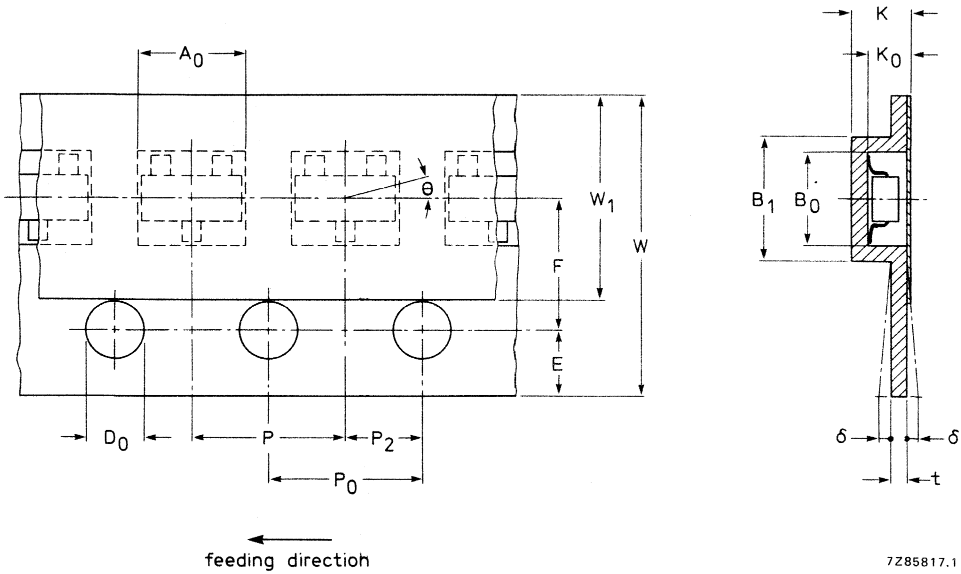


Fig. 1 Configuration of bandolier. Dimensions in mm.

Compartment				tol.
length	A_0	component length		+0,2
width	B_0	component width		+0,2
depth	K_0		0,95	+0,2
width outside	B_1		3,3	max.
pitch	P		4,0	±0,1
deviation	Θ		15°	max.
Sprocket hole				
diameter	D_0		1,5	+0,1
pitch	P_0		4,0	±0,1
distance	E		1,75	±0,1
cumulative (10) pitch error			±0,1	

Centre line dimensions			tol.
length direction	P_2	2,0	±0,05
width direction	F	3,5	±0,05
Fixing tape			
width	W_1	5,5	±0,25
thickness	—	0,1	max.
Carrier tape			
width	W	8,0	±0,2
bending	δ	0,3	max.
thickness	t	0,4	max.
Overall thickness	K	1,5	max.

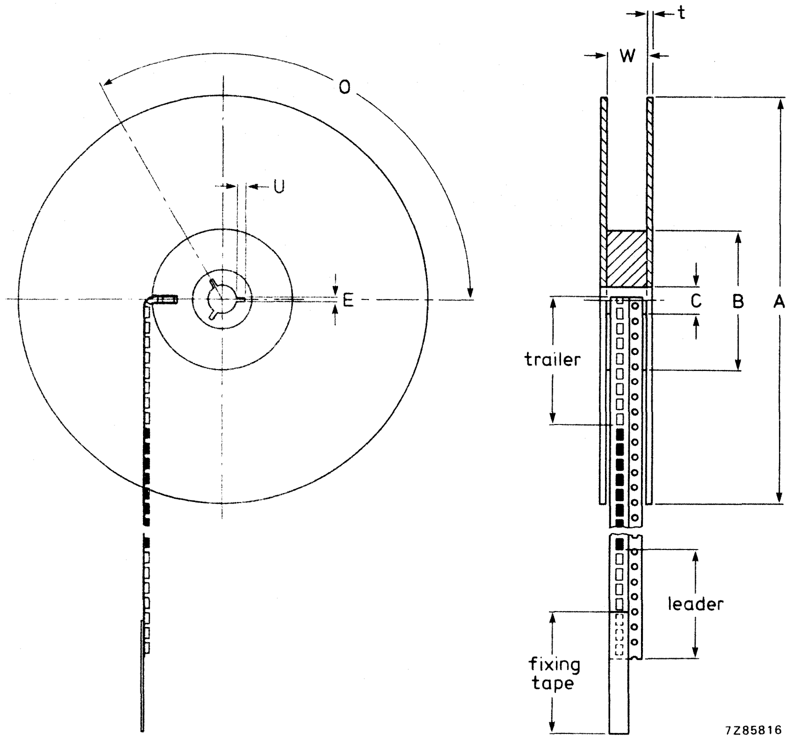


Fig. 2 Configuration of reel and flange (dimensions in mm).

Flange			tol.
diameter	A	180	+0 −2
thickness	t	1,5	+0,5 −0,1
space between flanges	W	9,5	±0,5

Hub			tol.
diameter	B	62	±1,5
spindle hole	C	12,75	+0,15 −0
key slit			
width	E	2	±0,5
depth	U	4	±0,5
location	O	120	degrees

Amount of devices per reel

The bandolier of a 180 mm reel contains at least 2500 devices with no more than 15 empty compartments (0,5%). Three consecutive empty places might be found provided this gap is followed by 6 consecutive devices.

The carrier tape (leader) starts with at least 75 empty positions (equivalent to 300 mm); the covering foil is at least 300 mm. In order to fix the carrier tape a self-adhesive tape of 20 to 50 mm is applied.

At the end of the bandolier (trailer) at least 75 empty positions (equivalent to a length of 300 mm) and 300 mm foil. For fixing onto the reel a self-adhesive tape of 20 to 50 mm is applied.

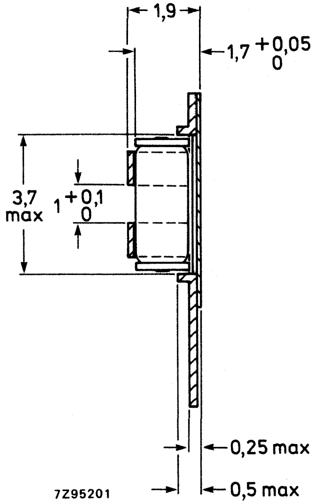


Fig. 3 Cross-sectional view of bandolier with SOD-80 devices.

Note: Testing of SOD-80 devices is possible in this tape. Total number of devices per reel is 2500.

BANDOLIER AND REEL SPECIFICATION FOR AXIAL-LEADED DIODES

This specification concerns all axial-leaded diodes in this handbook.

The taped and reeled products fulfil the requirements of IEC 286-1: Tape packaging of components with axial leads on continuous tapes.

Dimensions in mm

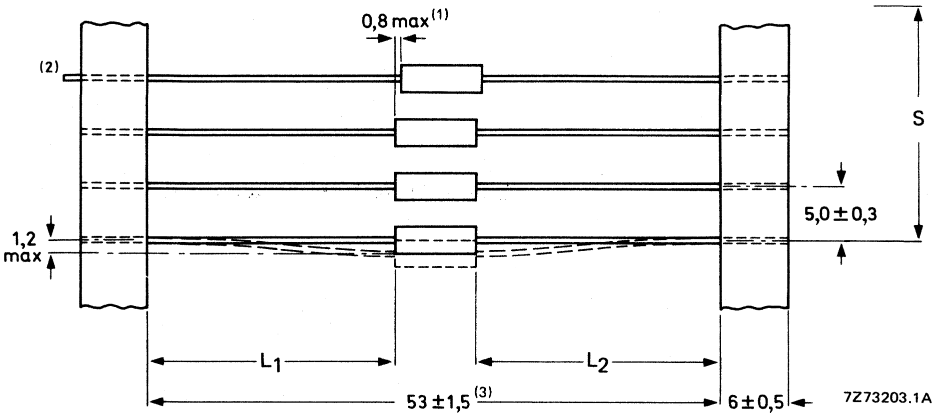


Fig. 1 Configuration of bandolier.

The red tape indicates the diode cathode side.

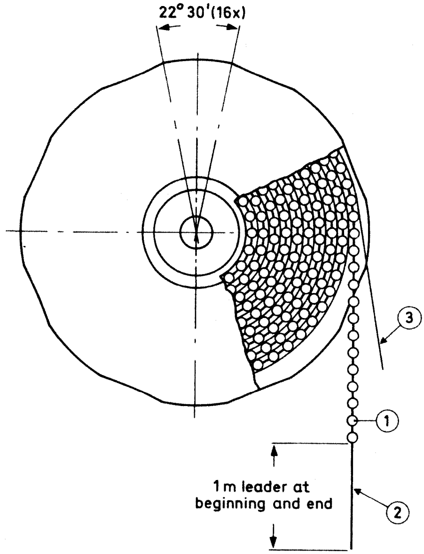
1. Displacement between any two diodes; for DO-34 maximum 0,4.
2. No protruding ends of lead except for BZX75 series maximum 1,2.
3. For outline SOD-61 this dimension is 58 ± 2 and for 26 mm tape this dimension is $26^{+1,5}_{-0}$.

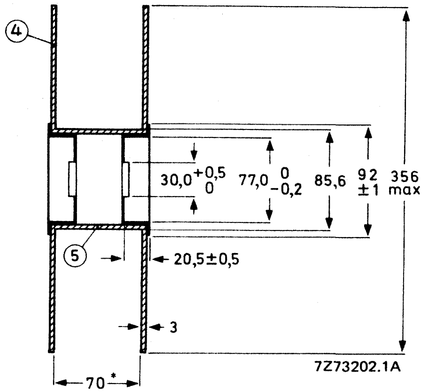
The cumulative space (S) measured over ten spacings = 50 ± 2; for 26 mm: 20 spacings (= 100 ± 2).

The diodes are centred so that $| L_1 - L_2 | \leq 1,2$ mm.

A black marker is printed on the white tape of the bandolier every 50 diodes.

The axial taping specification described above is compatible with automatic insertion equipment as manufactured by Universal, U.S.M. (Dynapert) and M.E.I. (Panasert).





* For outline SOD-61 this dimension is 75 and for 26 mm tape this dimension is 40.

Fig. 2 Reel dimensions (mm) for axial-leaded components.

(1) Diode
(2) Bandolier
(3) Paper
(4) Flange
(5) Cylinder

outline		quantity per reel, 52 mm tape
SOD-7	DO-7	7 000
SOD-27	DO-35	10 000 (B-zeners: 5000); see also Fig. 3
SOD-57	–	5 000
SOD-61	–	7 000 (additional packing in aluminium bag)
SOD-64	–	4 000
SOD-66	DO-41	5 000
SOD-68	DO-34	10 000; see also Fig. 3

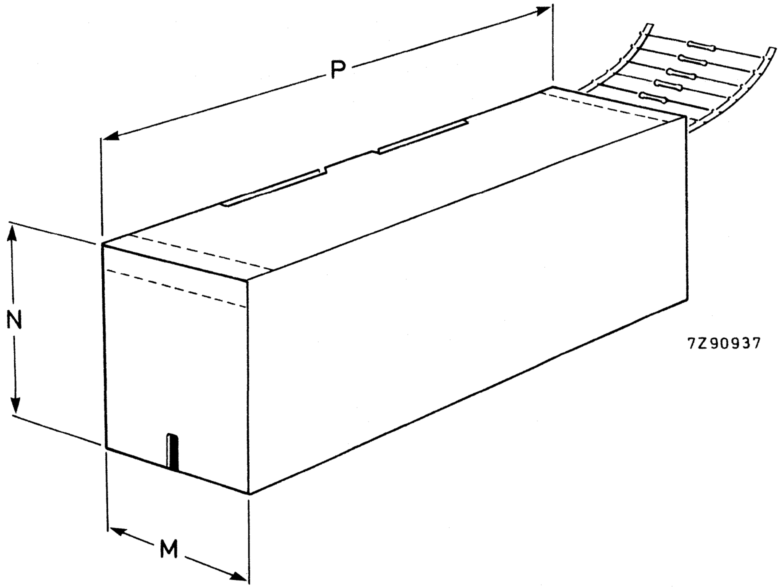


Fig. 3.

DO-34 and DO-35 axial-leaded components on 26 mm tape in ammo-boxes. Quantity: 5000 diodes per box. When ordering on 52 mm reel the last 3 digits of the catalogue number are 113: when ordering on 26 mm tape in ammo-pack the last 3 digits are 143.

	DO-34	DO-35
P	254	254 mm
N	63	77 mm
M	50	50 mm

BANDOLIER AND REEL SPECIFICATION FOR RADIAL-TAPED DIODES

Dimensions in mm

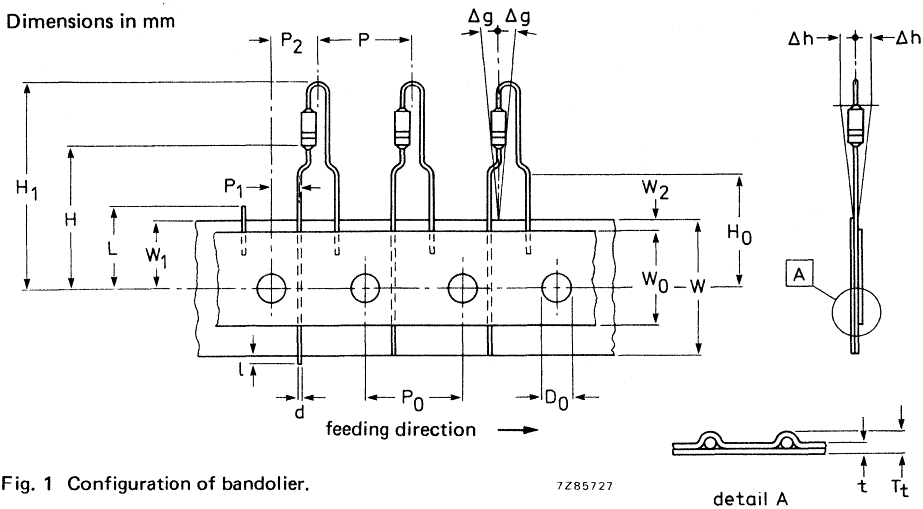


Fig. 1 Configuration of bandolier.

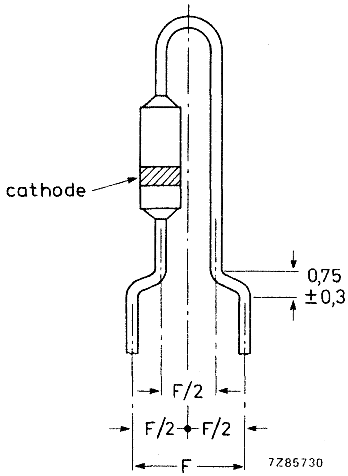


Fig. 2 Detail configuration of component shape.

break force of carrier tape > 15 N
extraction force > 5 N

$\Sigma\Delta P_0$	=	deviation of 20 spacings	± 1
F	=	lead-to-lead distance	$5{,}08^{+0{,}6}_{-0{,}1}$
H_1	=	top of component to tape centre	< 27,5
H	=	bottom of component to tape centre	19 ± 1
H_0	=	lead-wire clinch height	16 ± 0,5
L	=	length of cropped lead	< 11
ℓ	=	lead-wire protrusion	< 1
P	=	pitch of components	12,7 ± 1
P_2	=	feed hole centre to the middle of the leads	6,35 ± 1
P_1	=	feed hole centre to lead	3,81 ± 0,7
P_0	=	feed hole pitch	12,7 ± 0,3
T_t	=	total tape thickness	< 1,5
t	=	thickness tape + hold down tape	0,7 ± 0,2
D_0	=	feed hole diameter	4 ± 0,2
W_2	=	hold down tape position	0 to 1,5
W_0	=	hold down tape width	> 12,5
W_1	=	feed hole position	9 ± 0,5
W	=	tape width	$18^{+1{,}0}_{-0{,}5}$
Δ_g	=	component alignment	0 + 5°
Δ_h	=	component alignment	± 2

This specification concerns radial-taped diodes in DO-34 and DO-35 envelopes. The taped and reeled products fulfil the requirements of IEC 286-2: Tape packaging of components with unidirectional leads.

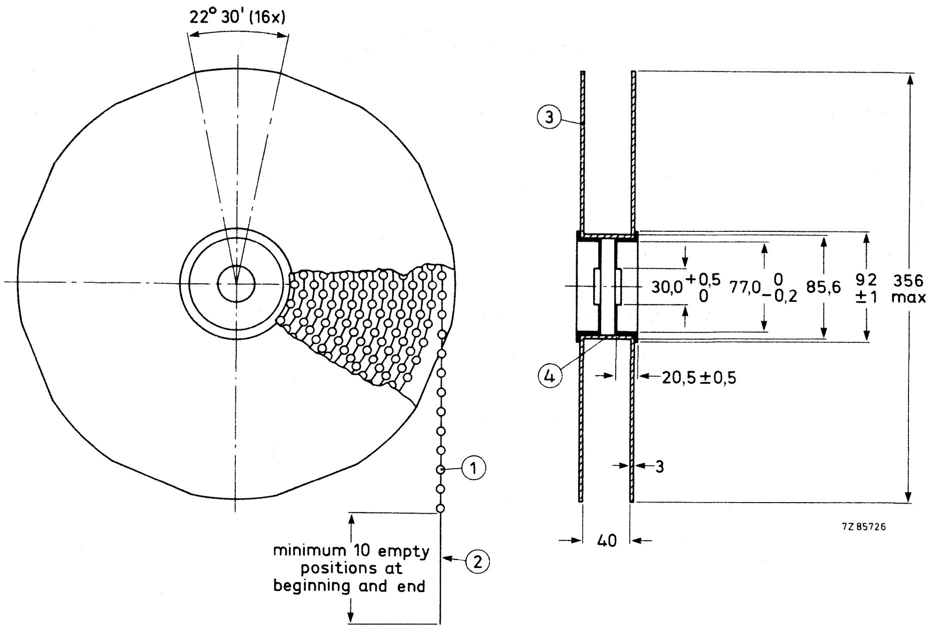
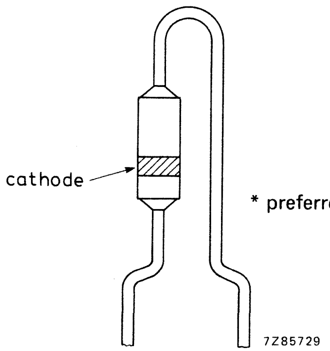


Fig. 3 Reel dimensions (mm) for radial-taped diodes.

(1) Diode
(2) Bandolier
(3) Flange
(4) Cylinder

Quantity per reel for DO-34 and DO-35 encapsulations 5000 diodes.

The diodes can be delivered on request with anode-leading* (+ leading) or with cathode-leading (− leading) configuration. The 11th and 12th digits of the 12 NC code are 16 and 36 for respectively anode-leading and cathode-leading.



* preferred

Fig. 4 + leading*.

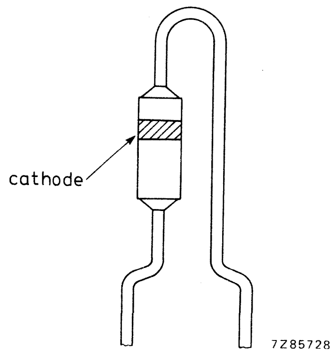


Fig. 5 − leading.

RULES FOR MOUNTING AND SOLDERING OF AXIAL-LEADED DEVICES*

Introduction

Excessive forces or temperatures applied to a diode may cause serious damage to the diode. To avoid damage when soldering and mounting the following rules should be followed.

General

Perpendicular forces on the body of the diode must be avoided.

Avoid sudden forces on the leads or body. These forces often are much higher than allowed.

High acceleration forces as a result of any shock (dropping on a hard surface for instance) must be prevented.

Bending

During bending the leads must be supported between body or stud and bending point.

Axial forces on the body during the bending process must not exceed 20 N.

Bending the leads through 90^o is allowed at any distance from the body when it is possible to support the leads during bending without contacting the envelope or weldings.

Bending close to the body or stud without supporting the leads only is allowed if the bend radius is greater than 0,5 mm.

Twisting

Twisting the leads is allowed at any distance from the body or stud if the lead is properly clamped between body or stud and twisting point.

Without clamping, twisting the leads is only allowed at a distance of greater than 3 mm from the body; the torque angle must not exceed 30^o.

Straightening

Straightening the leads is allowed if the applied pulling force in the axial direction does not exceed 20 N and the total duration is not longer than 5 seconds.

Soldering

Avoid any force on the body or leads during or just after soldering.

Do not correct the position of an already soldered device by pushing, pulling or twisting the body.

Prevent fast cooling after soldering.

* For Surface Mounted Devices (SMD's) please refer to Handbook "Surface Mounted Semiconductors".

Maximum allowable soldering time and minimum distance soldering point to seal for several envelopes

↓	→		Hand iron soldering mounted *otherwise than on printed-circuit board* (max. solder temp.: 300 °C)		Hand iron soldering, dip, wave or other bath soldering, *mounted on printed-circuit board* (max. solder temp.: 300 °C)	
			time s	distance mm	time s	distance mm
SOD-7	DO-7	glass	3	5,0	5	5,0
SOD-27	DO-35	glass	3	0,5	5	0,5
SOD-57	–	glass	3	0,5	5	0,5
SOD-61	–	glass	3	2,0	5	2,0
SOD-64	–	glass	3	0,5	5	0,5
SOD-66	DO-41	glass	3	3,0	5	3,0
SOD-68	DO-34	glass	3	0,5	5	0,5
SOD-81	–	glass	3	0,5	5	0,5
TO-18	–	metal	3	0,5	5	0,5
TO-92 (SOD-69)	–	plastic	3	2,5	5	2,5

MOUNTING

If the rules for mounting and soldering are observed properly, the following mounting or process methods are allowed:

- Preheating of the printed circuit board before soldering, up to a maximum of 100 °C.
- Flat mounting with the diode body in direct contact with the printed circuit board with or without metal tracks on both sides and/or plated-through holes.
- Flat mounting with the diode body in direct contact with hot spots or hot tracks during soldering.
- Upright mounting with the diode body in direct contact with the printed circuit board if the body is not in contact with metal tracks or plated-through holes.

General

Parts of the general mounting and soldering rules can be overruled by individual type mounting and soldering rules, mentioned with the type description.

SOLDERING RECOMMENDATIONS
SOT-23, SOT-143 AND SOT-89 ENVELOPES

SOT-23, SOT-143 and SOT-89 devices are ideally suited for placement onto thick and thin film substrates and printed circuit boards.

To assure reliable and consistent connections particular attention should be paid to:

1. **Flux**

   A non-active flux is recommended. Where active fluxes are employed, great care in subsequent substrate cleaning must be exercised.

2. **Metal-alloy solder or solder paste**

   Correct choice of solder alloy or solder paste to be employed e.g. 62% Sn, 36% Pb, 2% Ag or 60% Sn/40% Pb. Any paste used should contain at least 85% metal dry weight.

3. **Soldering temperature**

   This will vary according to the actual method employed.

REFLOW SOLDERING

The preferred technique for mounting microminiature components on hybrid thick and thin-film is the method of reflow soldering.

The tags of SOT-23, SOT-143 and SOT-89 envelopes are pre-tinned and the best results are obtained if a similar solder is applied to the corresponding soldering areas on the substrate. This can be done by either dipping the substrate in a solder bath or by screen printing a solder paste.
The maximum temperature of the leads or tab during the soldering cycle should not exceed 285 °C.
The most economic method of soldering is a process in which all different components are soldered simultaneously for example SOT-23, SOT-143 or SOT-89 devices, capacitors and resistors.

Having first been fluxed, all components are positioned on the substrate. The slight adhesive force of the flux is sufficient to keep the components in place. Solder paste contains a flux and has therefore good inherent adhesive properties which eases positioning of the components.

With the components in position the substrate is heated to a point where the solder begins to flow. This can be done on a heating plate or on a conveyor belt running through an infrared tunnel. The maximum allowed temperature of the plastic body of a device must be kept below 280 °C during the soldering cycle. For further temperature behaviour during the soldering process see Figs 2 and 3.

The surface tension of the liquid solder tends to draw the tags of the device towards the centre of the soldering area and has thus a correcting effect on slight mispositionings. However, if the layout leaves something to be desired the same effect can result in undesirable shifts; particularly if the soldering areas on the substrate and the components are not concentrally arranged. This problem can be solved using a standard contact pattern, which leaves sufficient scope for the self-positioning effect (see Figs 4 and 5).

After cooling the connections may be visually inspected and, where necessary, repaired with a light soldering iron. Finally any remaining flux must be removed carefully.

IMMERSION SOLDERING

Where a complete substrate or printed circuit board is immersed in solder:
a. The temperature of the soldering bath should not exceed 280 °C.
b. The duration of the soldering cycle should not exceed 10 seconds.
c. Forced cooling may be applied (see Fig. 1).

HAND SOLDERING

It is possible to solder microminiature devices with a light hand-held soldering iron, but this method has obvious drawbacks and should therefore be restricted to laboratory use and/or incidental repairs on production circuits.

1. It is time-consuming and expensive.
2. The device cannot be positioned accurately and therefore the connecting tags may come into contact with the substrate and damage it.
3. There is a great risk of breaking either substrate or even internal connections inside the encapsulation.
4. The envelope may be damaged by the iron.

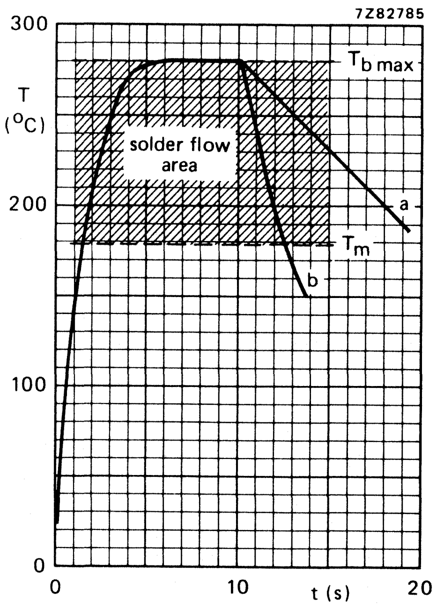
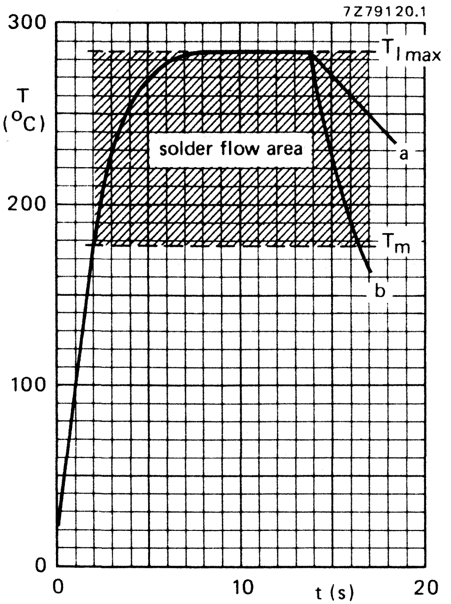


Fig. 1 Device temperature during *immersion* soldering.

Maximum time of immersion in soldering bath is 10 seconds at an ambient temperature of 25 °C.
a = free convection cooling; b = forced cooling.
$T_{b\,max}$ = maximum bath temperature (280 °C).
T_m = melting temperature of solder (179 °C).



a = free convection cooling.

b = permissible forced cooling.

$T_{l\,max}$ = Maximum lead or tab temperature = 285 °C.

T_m = Melting point of the solder is 179 °C.

T_{amb} = 25 °C.

Time of heat supply:
without preheating max. 14 s
with preheating max. 10 s

Maximum time of preheating 45 s

Fig. 2 Reflow soldering without preheating.

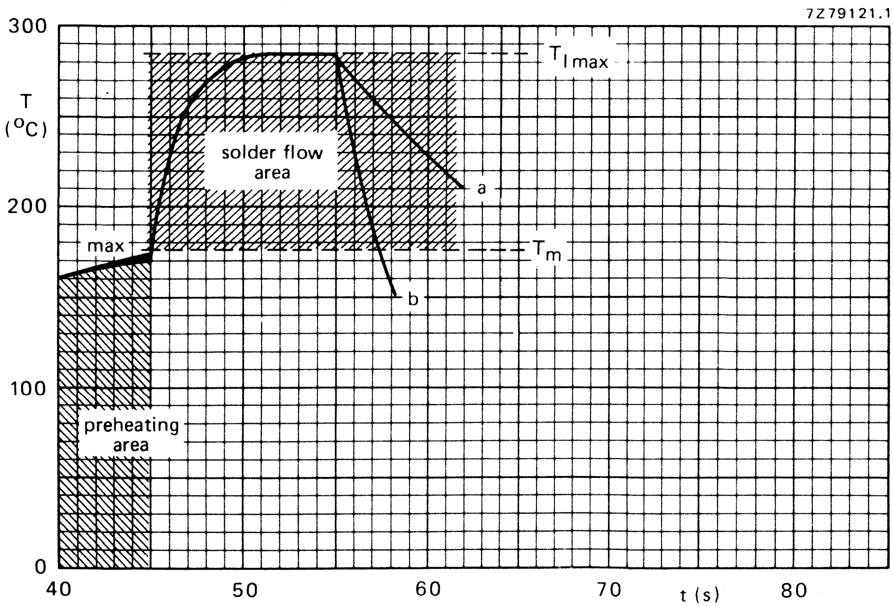


Fig. 3 Reflow soldering with preheating.

Minimum required dimensions of metal connection pads on hybrid thick and thin-film substrates.

Dimensions in mm

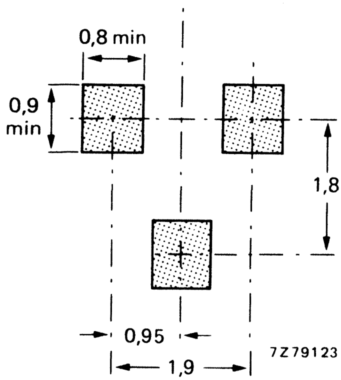


Fig. 4 SOT-23 pattern.

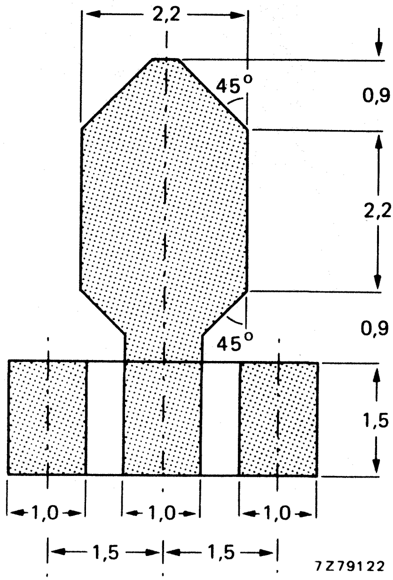


Fig. 5 SOT-89 pattern.

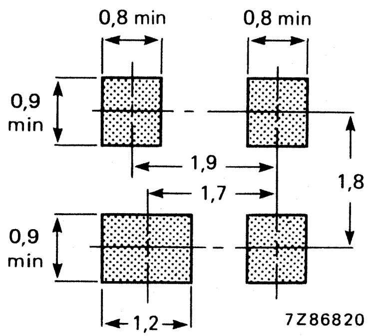


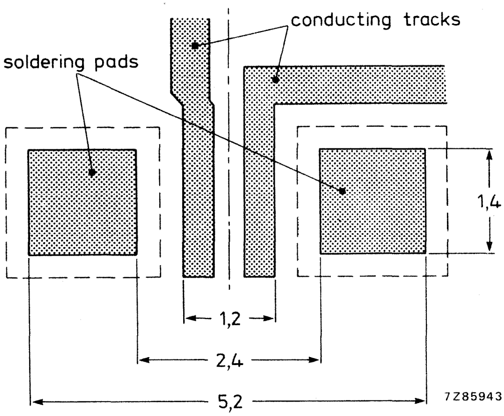
Fig. 6 SOT-143 pattern.

SOLDERING RECOMMENDATIONS
SOD-80 ENVELOPE

The layout shown below is intended for use with mounting of diodes having a SOD-80 envelope onto a printed circuit board in those cases where the diode is glued to the p.c. board first and soldered afterwards.

The dimensions given may be smaller if the diode in question is not fixed to the substrate prior to soldering. The position of the SOD-80 device is then self-adjusted during the soldering process.

Dimensions in mm



THERMAL CHARACTERISTICS OF SOT-23 AND SOT-143 ENVELOPES

The heat generated in a semiconductor chip normally flows by various paths to the surroundings (ambient).

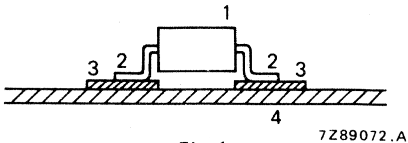


Fig. 1.

1. Heat radiation from the envelope to ambient (1).
   This heat transfer can be neglected when the envelope is mounted on a substrate or printed circuit board.
2. Heat transmission via leads (2) soldering points (3) and substrate (4).

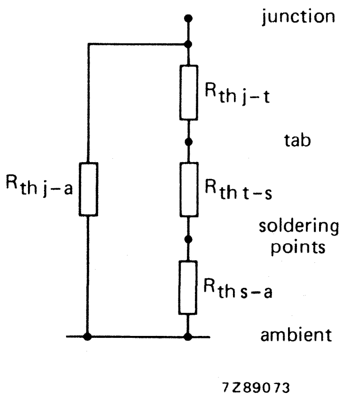


Fig. 2 Thermal behaviour of heat flow when the device is mounted on a substrate or printed circuit board.

$R_{th\ j\text{-}t}$ = Thermal resistance from junction to tab.

$R_{th\ t\text{-}s}$ = Thermal resistance from tab to soldering points.

$R_{th\ s\text{-}a}$ = Thermal resistance from soldering points to ambient.

$R_{th\ j\text{-}a}$ = Thermal resistance from junction to ambient.

Heat transfer directly from envelope to ambient

This depends on the difference between the temperatures of envelope and the surroundings. When the device is mounted on a substrate or printed circuit board direct heat flow can usually be neglected in relation to the heat flow via leads and substrate.
Thus the thermal model can be as in Fig. 3.

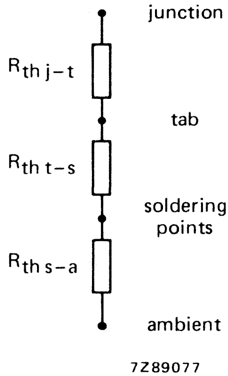


Fig. 3 Basic thermal model.

Heat transfer from junction to tab

This is an internal heat transfer and has been measured. In general it is:

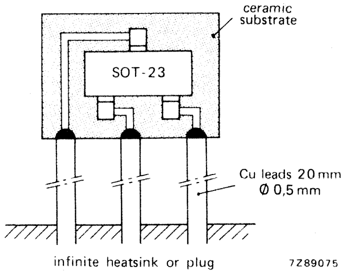
for high-frequency transistors, low-power diodes and (MOS) FETs	60 K/W
for low-frequency and switching transistors	50 K/W
for low-frequency medium-power transistors	30 K/W

Heat transfer from tab to soldering points

This value has also been measured for SOT-23 with $P_{tot} < 350$ mW	280 K/W
for types of semiconductors in this envelope with $P_{tot} < 425$ mW	260 K/W
for types of semiconductors in a SOT-143 envelope this value is	310 K/W

Heat transfer from soldering points to ambient

This depends on the shape and material of tracks and substrate. In figures 4 and 5 standard mounting conditions are given to set up the maximum power ratings for SOT-23 and SOT-143 encapsulations.



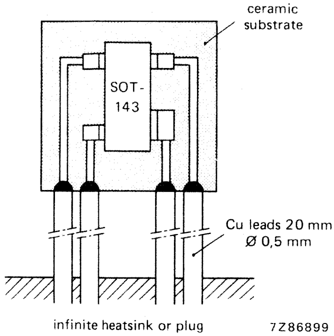


Fig. 4 Test circuits SOT-23 and SOT-143 mounting conditions on a ceramic substrate.

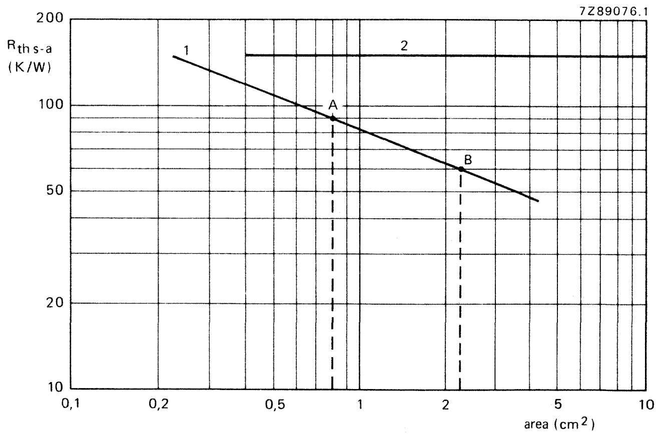


Fig. 5 Heat transfer from soldering points to ambient.

1. Ceramic substrate

Point A on the curve in Fig. 5 is for an area of the ceramic substrate of 8 mm x 10 mm x 0,7 mm for the maximum rating of all high-frequency, low-frequency and switching transistors and also for all diodes.
Point B on the curve in Fig. 5 is for an area of the ceramic substrate of 15 mm x 15 mm x 0,7 mm for the maximum rating of low-frequency medium-power semiconductors.

2. Printed circuit board

$R_{th\ s\text{-}a}$ = 150 K/W for SOT-23 and SOT-143 envelopes mounted on a printed circuit board.

The values for the thermal resistance from junction to tab, and tab to soldering points, are mentioned on page 2 and Fig. 5.
The formula for devices in SOT-23 with one crystal can be generalized:

$T_j = P\,(R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

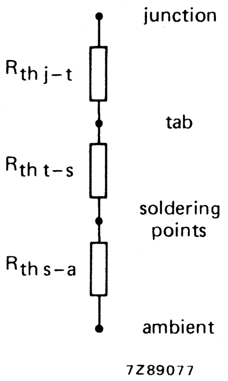


Fig. 6 Thermal model of SOT-23 envelopes with one crystal.

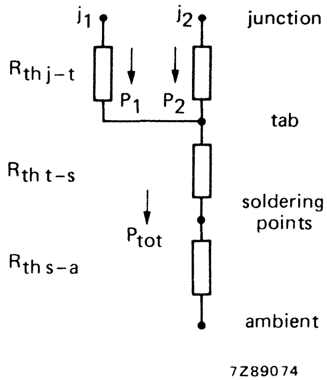


Fig. 7 Thermal model of SOT-23 envelopes with two crystals (double diode).

The formulae for devices with two crystals (double diodes) are:

$T_{tab} = P_{tot} \cdot (R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb} = P_{tot}\,(280 + 90) + T_{amb}$

$T_{j1} = (P_1 \times R_{th\ j\text{-}t}) + T_{tab} = P_1 \cdot 60 + T_{tab}$

$T_{j2} = (P_2 \times R_{th\ j\text{-}t}) + T_{tab} = P_2 \cdot 60 + T_{tab}$

As mentioned on page 2:

$R_{th\ j\text{-}t}$ for diodes is 60 K/W.

$R_{th\ s\text{-}a}$ (area 8 mm x 10 mm x 0,7 mm) = 90 K/W.

$R_{th\ t\text{-}s}$ for all semiconductors in SOT-23 = 280 K/W.

Thus:

$T_{j1} = 60\,P_1 + 370\,P_{tot} + T_{amb}$.

$T_{j2} = 60\,P_2 + 370\,P_{tot} + T_{amb}$.

THERMAL MODEL

Figure 1 illustrates the various components of thermal resistance for a diode mounted with symmetrical lead length.

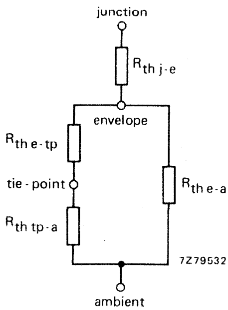


Fig. 1 Thermal resistance model.

The values for these various parameters depend on the outline of the diode, the leadlength and the method used to mount the device on the printed circuit board. Some useful values are shown in Table 1.

Table 1 Thermal resistance values (K/W).

thermal resistance	mounting condition	SOD-81	SOD-57	SOD-64	note
$R_{th\ j\text{-}e}$ junction-envelope		32	18	12	
$R_{th\ e\text{-}tp}$ envelope-tie-point	lead length (mm)				
	5	15	15	7	
	10	30	30	14	
	15	45	45	21	
	20	60	60	28	
	25	75	75	35	
$R_{th\ e\text{-}a}$ envelope-ambient	length length (mm)				
	5	600	580	410	
	10	450	445	300	
	15	370	350	230	
	20	310	290	185	
	25	265	245	155	
$R_{th\ tp\text{-}a}$ tie-point-ambient	mounted on a 1,5 mm thick epoxy-glass printed circuit board with a copper thickness ⩾ 40 μm (Fig. 2)	70	70	70	1. mounted as in Fig. 2
		55	55	55	2. mounted with Cu laminate per lead of 1 cm²
		45	45	45	3. mounted with Cu laminate per lead of 2,25 cm²

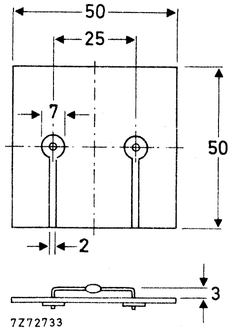


Fig. 2 Mounted on a printed-circuit board.

Using this model, values for the thermal resistance from junction to ambient can be calculated using the formula:

$$R_{j\text{-}a} = \frac{R_{j\text{-}e} + R_{e\text{-}a}\,(R_{e\text{-}tp} + R_{tp\text{-}a})}{R_{e\text{-}a} + R_{e\text{-}tp} + R_{tp\text{-}a}}$$

	SOD-81	SOD-57	SOD-64	Note
$R_{th\ j\text{-}a}$	120 K/W	100 K/W	75 K/W	Mounted on 1,5 mm thick epoxy-glass p.c. board with copper thickness ⩾ 40 μm; Fig. 2.
$R_{th\ j\text{-}tp}$	60 K/W	46 K/W	25 K/W	Lead length = 10 mm.

Note:

The junction temperature can then be calculated by using dissipation graphs and the above thermal model.

DEVICE DATA

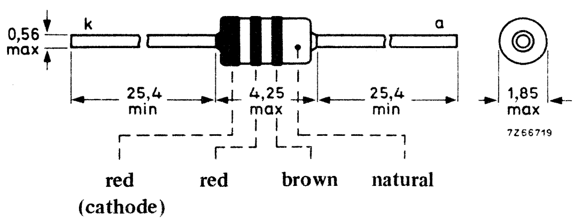
GENERAL PURPOSE DIODE

Silicon planar epitaxial diode in a DO-35 envelope; intended for general purpose and can also be used as regulator.

QUICK REFERENCE DATA				
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	400	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,50	°C/mW
Forward voltage at I_F = 0,1 mA	V_F		460 to 520	mV
I_F = 1,0 mA	V_F		560 to 620	mV
I_F = 10 mA	V_F		680 to 750	mV
I_F = 100 mA	V_F		825 to 950	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	2,5	pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

DO-35



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

Voltage				
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Currents				
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	400	mA
Non-repetitive peak forward current t = 1 µs	I_{FSM}	max.	4000	mA
t = 1 s	I_{FSM}	max.	1000	mA
Temperatures				
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,50	°C/mW

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

Forward voltage				
I_F = 0,1 mA	V_F		460 to 520	mV
I_F = 1,0 mA	V_F		560 to 620	mV
I_F = 5,0 mA	V_F		640 to 700	mV
I_F = 10 mA	V_F		680 to 750	mV
I_F = 100 mA	V_F		825 to 950	mV
Reverse current				
V_R = 10 V	I_R	<	1500	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2,5	pF

[1]) For sinusoidal operation $I_{F(AV)}$ = 130 mA.

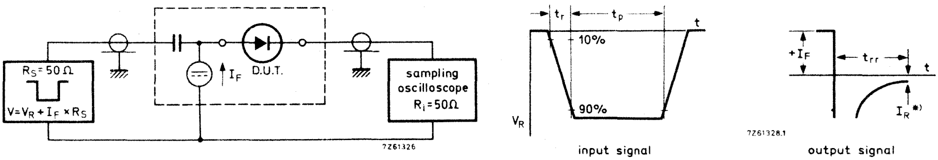
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Reverse recovery time when switched from

$I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100\ \Omega$;

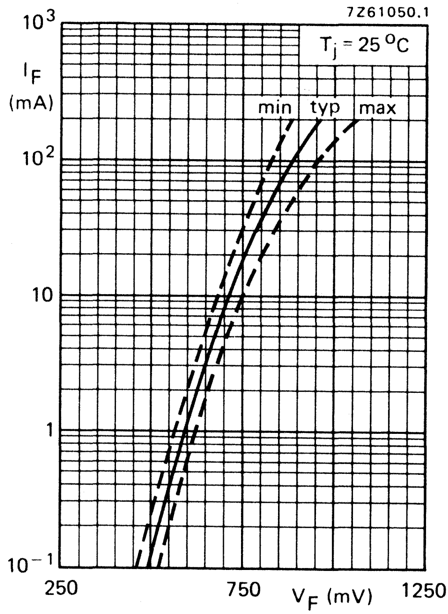
measured at $I_R = 1$ mA t_{rr} < 4 ns

Test circuit and waveforms :



Input signal	: Rise time of the reverse pulse	t_r = 0,6 ns	*) I_R = 1 mA
	Reverse pulse duration	t_p = 100 ns	
	Duty factor	δ = 0,05	
Oscilloscope	: Rise time	t_r = 0,35 ns	

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)


7Z61050.1
10^3
I_F
(mA)
10^2
10
1
10^{-1}
$T_j = 25\ ^oC$
min
typ
max
250
750
1250
V_F (mV)

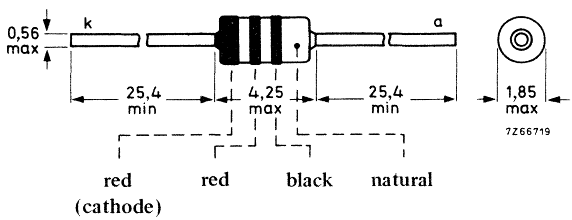
GENERAL PURPOSE DIODE

Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	30	V
Repetitive peak forward current	I_{FRM}	max.	400	mA
Storage temperature	T_{stg}	−65 to +200		^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,50	$^oC/mW$
Forward voltage at I_F = 1 mA	V_F	<	625	mV
I_F = 100 mA	V_F	<	950	mV
I_F = 200 mA	V_F	<	1050	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	2,5	pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA Dimensions in mm

DO-35



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

Voltages

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	200	mA [1]
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	400	mA
Non-repetitive peak forward current t = 1 µs	I_{FSM}	max.	4000	mA
t = 1 s	I_{FSM}	max.	1000	mA

Temperatures

Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,50	°C/mW

CHARACTERISTICS $T_j = 25\ ^oC$

Forward voltage

I_F = 1 mA	V_F	<	625	mV
I_F = 100 mA	V_F	<	950	mV
I_F = 200 mA	V_F	<	1050	mV

Reverse current

V_R = 10 V	I_R	<	25	nA
V_R = 30 V	I_R	<	200	nA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	2,5	pF

[1] For sinusoidal operation $I_{F(AV)}$ = 130 mA.

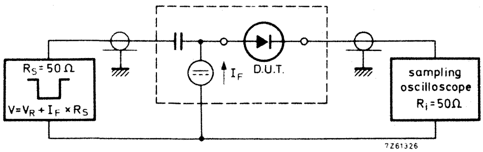
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

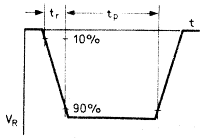
Reverse recovery time when switched from

I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω;

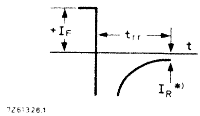
measured at I_R = 1 mA | t_{rr} < 4 ns

Test circuit and waveforms :





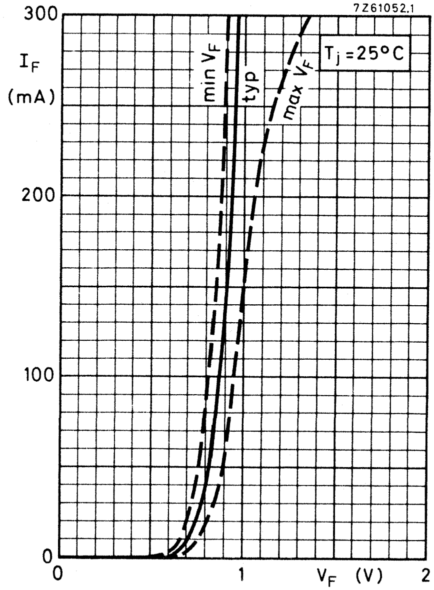
input signal



output signal

Input signal	: Rise time of the reverse pulse	t_r = 0,6 ns	*) I_R = 1 mA
	Reverse pulse duration	t_p = 100 ns	
	Duty factor	δ = 0,05	
Oscilloscope	: Rise time	t_r = 0,35 ns	

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)


7Z61052.1
300
200
100
0
I_F
(mA)
min V_F
typ
max V_F
$T_j = 25°C$
0
1
2
V_F (V)

SILICON A.M. BAND SWITCHING DIODE

The BA223 is a switching diode in whiskerless glass encapsulation. It is intended for band switching in a.m. radio receivers.

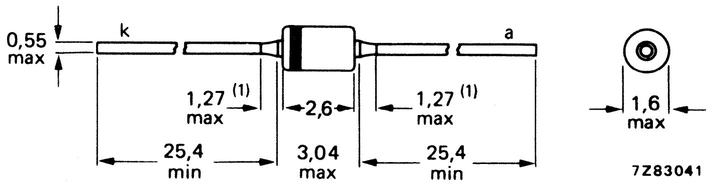
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	20	V
Forward current (d.c.)	I_F	max.	50	mA
Junction temperature	T_j	max.	150	°C
Diode capacitance at f = 1 MHz V_R = 6 V	C_d	<	3,5	pF
Series resistance at f = 1 MHz I_F = 10 mA	r_D	<	1,5	Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	50 mA
Storage temperature	T_{stg}		−55 to +150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,5 °C/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 50 mA	V_F	<	1,0 V
Reverse current			
V_R = 20 V	I_R	<	100 nA
V_R = 20 V; T_j = 125 °C	I_R	<	20 μA
Diode capacitance at f = 1 MHz			
V_R = 6 V	C_d	<	3,5 pF
Series resistance at f = 1 MHz			
I_F = 10 mA	r_D	<	1,5 Ω

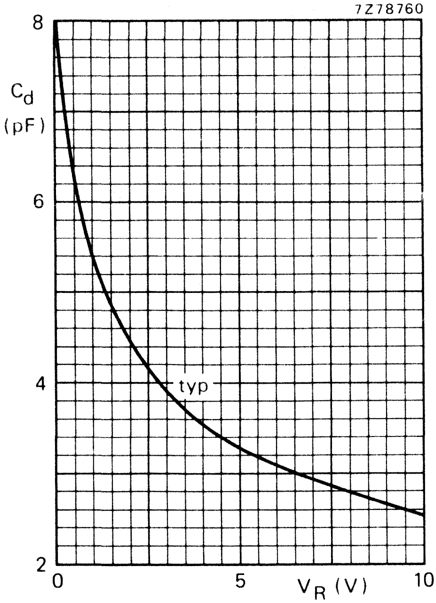


Fig. 2 f = 1 MHz; T_j = 25 °C.

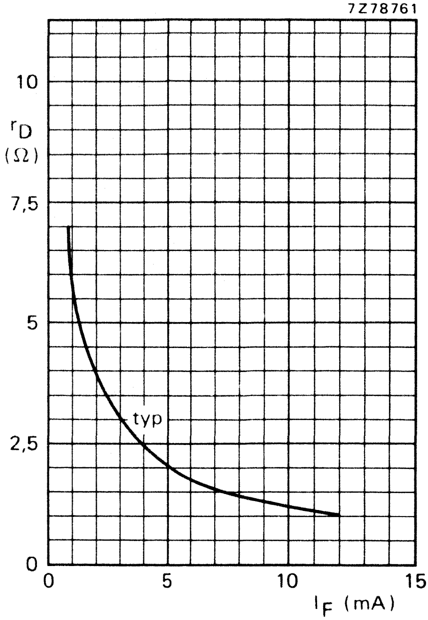


Fig. 3 f = 1 MHz; T_j = 25 °C.

SILICON RATIO DETECTOR DIODE

Silicon planar epitaxial diode in DO-35 envelope, intended for use in ratio detector circuits. Due to small spreads of forward voltage at low currents and of junction capacitance, the diodes can be used as matched pairs.

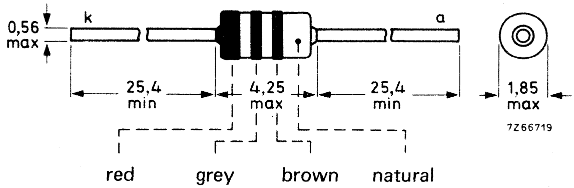
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	50	V
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	450	mA
Forward voltage	V_F	360 to	420	mV
Diode capacitance	C_d	<	1,2	pF
Junction temperature	T_j	max.	200	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35 (SOD-27).



RATINGS

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

Continuous reverse voltage	V_R	max.	50 V
Forward current (d.c.)	I_F	max.	200 mA
Repetitive peak forward current	I_{FRM}	max.	450 mA
Storage temperature	T_{stg}	−65 to +200	°C
Junction temperature	T_j	max.	+200 °C

THERMAL RESISTANCE

from junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6 K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 10 μA	V_F	360 to 420	mV
I_F = 100 mA	V_F	< 1000	mV
Reverse current			
V_R = 50 V	I_R	< 50	nA
Diode capacitance			
V_R = 0, f = 1 MHz	C_d	< 1,2	pF

Dynamic characteristics

Input peak voltage	V_{im}	3	V
Frequency	f_i	10,7	MHz
Load capacitor	C_L	330	pF
Load resistor	R_L	0,033	MΩ
Efficiency	η	85	%
Diode resistance	r_D	12	kΩ

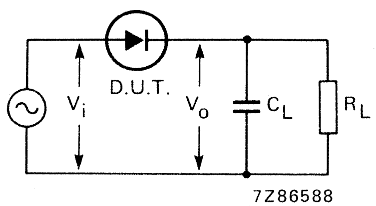


Fig. 2 Test circuit.

LOW VOLTAGE STABISTOR

Silicon planar epitaxial diode in DO-35 envelope. This diode is intended for low voltage stabilizing e.g. bias stabilizer in class-B output stages, clipping, clamping and meter protection.

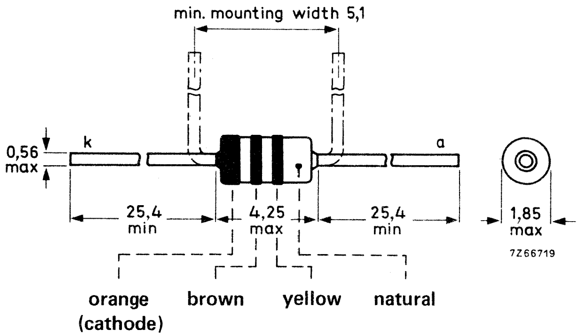
QUICK REFERENCE DATA

Repetitive peak forward current	I_{FRM}	max.	250	mA	
Storage temperature	T_{stg}	−65 to +	200	°C	
Junction temperature	T_j	max.	200	°C	
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	K/mW	←
Forward voltage					
I_F = 0,1 mA	V_F		610 to 690	mV	
I_F = 1,0 mA	V_F		680 to 760	mV	
I_F = 10 mA	V_F		750 to 830	mV	
I_F = 100 mA	V_F		850 to 940	mV	←
Diode capacitance					
V_R = 0; f = 1 MHz	C_d	<	140	pF	

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35 (SOD-27).



Products approved to CECC 50 001-026 available on request.

RATINGS

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

Repetitive peak forward current	I_{FRM}	max.	250 mA
Storage temperature	T_{stg}		−65 to + 200 °C
Junction temperature	T_j	max.	200 °C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,38 K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 0,1 mA	V_F		610 to 690 mV
I_F = 1,0 mA	V_F		680 to 760 mV
I_F = 5,0 mA	V_F		730 to 810 mV
I_F = 10 mA	V_F		750 to 830 mV
→ I_F = 100 mA	V_F		850 to 940 mV
Reverse current			
V_R = 4 V	I_R	<	5 μA
Temperature coefficient			
I_F = 1 mA	S_F	typ.	−1,8 mV/K
Differential resistance at f = 1 kHz			
I_F = 1 mA	r_{diff}	typ.	30 Ω
I_F = 10 mA	r_{diff}	typ.	3,5 Ω
		<	6,0 Ω
Diode capacitance			
V_R = 0; f = 1 MHz	C_d	<	140 pF

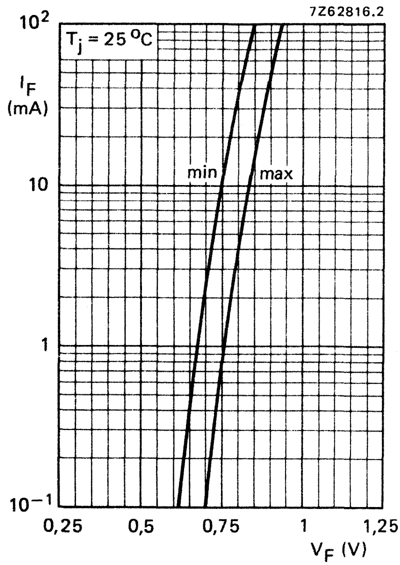


Fig. 2.

LOW VOLTAGE STABISTOR

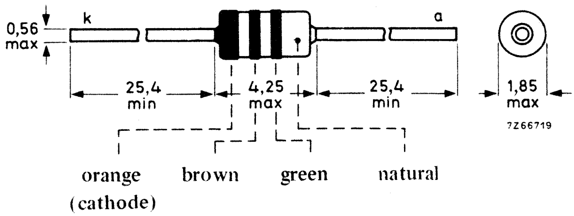
Silicon planar epitaxial diode in a DO-35 envelope primarily intended for low voltage stabilizing.

QUICK REFERENCE DATA				
Repetitive peak reverse voltage	V_{RRM}	max.	5	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Storage temperature	T_{stg}		-65 to +200	^oC
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,60	$^oC/mW$
Forward voltage at I_F = 0,1 mA	V_F		480 to 540	mV
I_F = 1,0 mA	V_F		590 to 660	mV
I_F = 10 mA	V_F		710 to 790	mV
I_F = 100 mA	V_F		875 to 1050	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	3,0	pF

MECHANICAL DATA

Dimensions in mm

DO-35



RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltage

Repetitive peak reverse voltage	V_{RRM}	max.	5	V	

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	100	mA	1)
Forward current (d.c.)	I_F	max.	100	mA	
Repetitive peak forward current	I_{FRM}	max.	225	mA	
Non-repetitive peak forward current; t = 1 μs	I_{FSM}	max.	2000	mA	
t = 1 s	I_{FSM}	max.	500	mA	

Temperatures

Storage temperature	T_{stg}	−65 to +200		^{o}C
Junction temperature	T_j	max.	200	^{o}C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,60	$^{o}C/mW$

CHARACTERISTICS $T_j = 25\ ^{o}C$

Forward voltage

I_F = 0,1 mA	V_F	480 to	540	mV
I_F = 1,0 mA	V_F	590 to	660	mV
I_F = 5,0 mA	V_F	670 to	740	mV
I_F = 10 mA	V_F	710 to	790	mV
I_F = 100 mA	V_F	875 to	1050	mV

Reverse current

V_R = 5 V	I_R	<	1500	nA

Temperature coefficient at I_F = 1 mA	S_F	typ.	−2,1	$mV/^{o}C$

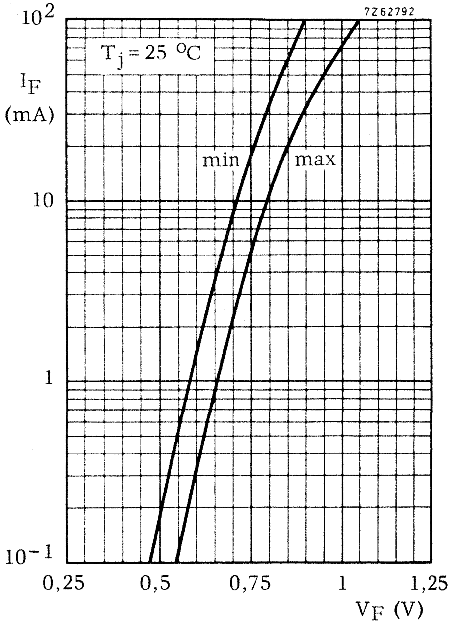
Differential resistance at f = 1 kHz

I_F = 1 mA	r_{diff}	typ.	50	Ω
I_F = 10 mA	r_{diff}	typ.	6	Ω
		<	7	Ω

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	3,0	pF

1) For sinusoidal operation $I_{F(AV)}$ = 75 mA.


7Z62792
10^2
$T_j = 25\ ^oC$
I_F
(mA)
min
max
10
1
10^{-1}
0,25
0,5
0,75
1
1,25
V_F (V)

10 V, 30 V and 50 V GENERAL PURPOSE DIODES

Silicon planar epitaxial diodes in DO-35 envelopes intended for general purpose applications.
They have reverse voltages up to 10 V for BA316, 30 V for BA317 and 50 V for BA318.

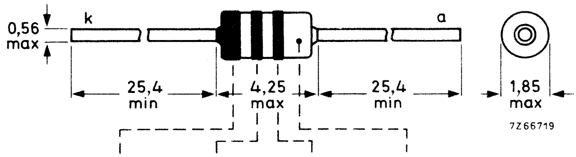
QUICK REFERENCE DATA

			BA316	BA317	BA318	
Continuous reverse voltage	V_R	max.	10	30	50	V
Repetitive peak forward current	I_{FRM}	max.		225		mA
Storage temperature	T_{stg}			−65 to +200		^oC
Junction temperature	T_j	max.		200		^oC
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=		0,60		$^oC/mW$
Forward voltage at I_F = 1,0 mA	V_F	<		700		mV
I_F = 10 mA	V_F	<		850		mV
I_F = 100 mA	V_F	<		1100		mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<		2		pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<		4		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35.



BA316:	orange	brown	blue	natural
BA317:	orange	brown	violet	natural
BA318:	orange (cathode)	brown	grey	natural

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltage

			BA316	BA317	BA318	
Continuous reverse voltage	V_R	max.	10	30	50	V

Currents

Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	100	mA	1)
Forward current (d.c.)	I_F	max.	100	mA	
Repetitive peak forward current	I_{FRM}	max.	225	mA	
Non-repetitive peak forward current					
t = 1 μs	I_{FSM}	max.	2000	mA	
t = 1 s	I_{FSM}	max.	500	mA	

Temperatures

Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,60	°C/mW

CHARACTERISTICS $T_j = 25\ ^oC$

Forward voltage

I_F = 1,0 mA	V_F	<	700	mV
I_F = 10 mA	V_F	<	850	mV
I_F = 100 mA	V_F	<	1100	mV

Reverse current

			BA316	BA317	BA318	
V_R = 10 V	I_R	<	200	50	–	nA
V_R = 30 V	I_R	<	–	200	50	nA
V_R = 50 V	I_R	<	–	–	200	nA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	2	pF

1) For pulse operation see Figs 3 to 6. For sinusoidal operation see Figs 7 to 10.

CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Reverse recovery time when switched from

I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω;

Measured at I_R = 1 mA t_{rr} < 4 ns

Test circuit and waveforms :

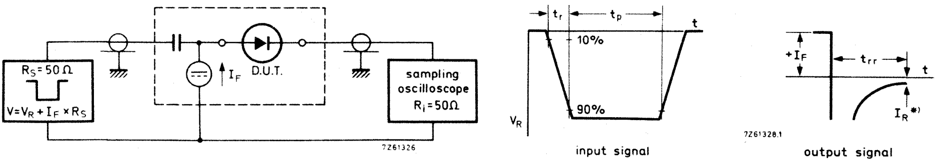


Fig. 2.

Input signal :	Rise time of the reverse pulse	t_r = 0, 6 ns	*) I_R = 1 mA
	Reverse pulse duration	t_p = 100 ns	
	Duty factor	δ = 0, 05	
Oscilloscope:	Rise time	t_r = 0, 35 ns	

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

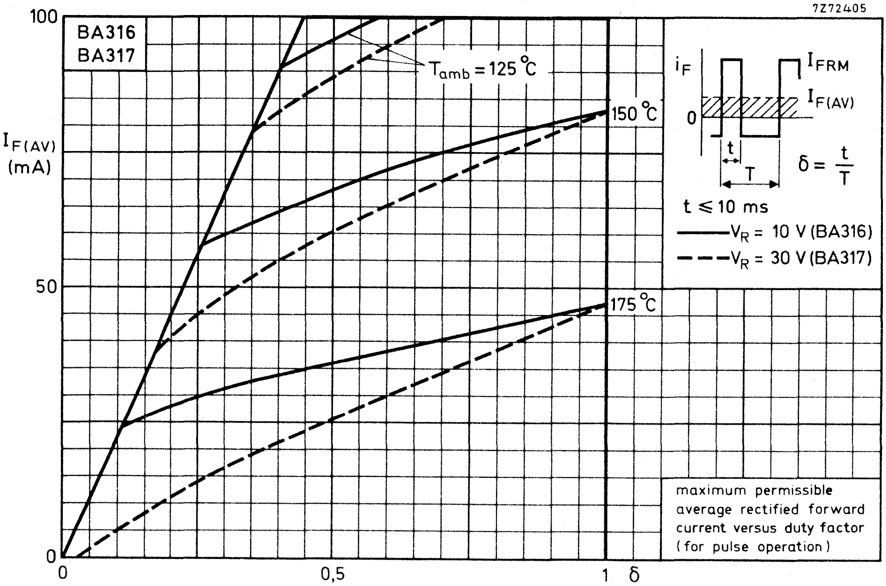

7Z72405
BA316
BA317
T_{amb} = 125 °C
150 °C
175 °C
$I_{F(AV)}$ (mA)
100
50
0
0
0,5
1
δ
i_F
I_{FRM}
$I_{F(AV)}$
t
T
δ = t/T
t ≤ 10 ms
V_R = 10 V (BA316)
V_R = 30 V (BA317)
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 3.

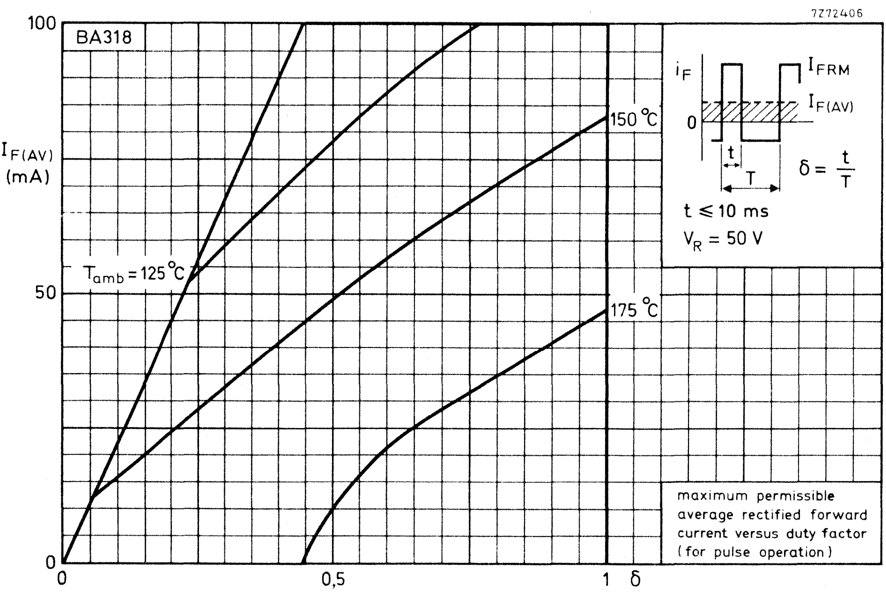

7Z72406
BA318
T_{amb} = 125 °C
150 °C
175 °C
$I_{F(AV)}$ (mA)
100
50
0
0
0,5
1
δ
i_F
I_{FRM}
$I_{F(AV)}$
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 4.

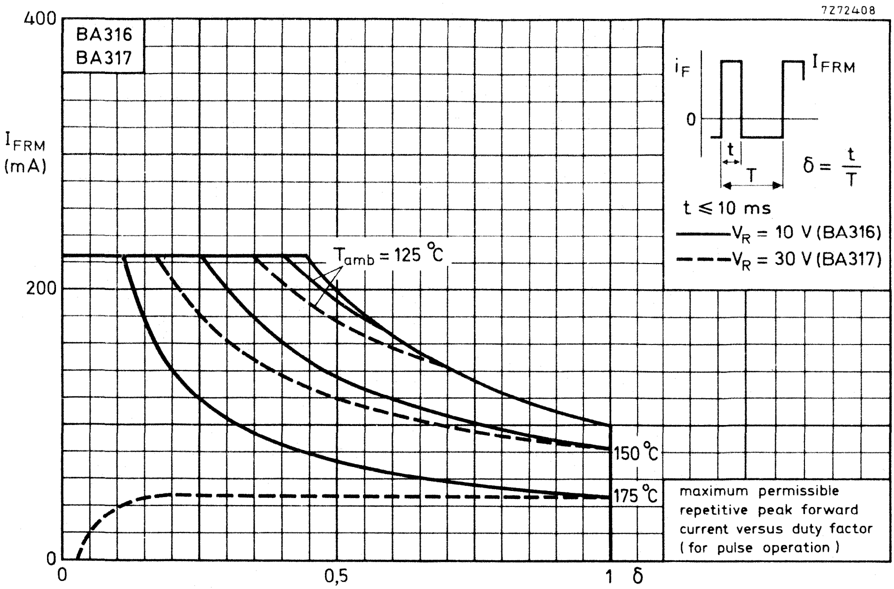

7Z72408
BA316
BA317
400
200
0
I_{FRM} (mA)
0
0,5
1
δ
T_{amb} = 125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ⩽ 10 ms
V_R = 10 V (BA316)
V_R = 30 V (BA317)
maximum permissible
repetitive peak forward
current versus duty factor
(for pulse operation)

Fig. 5.

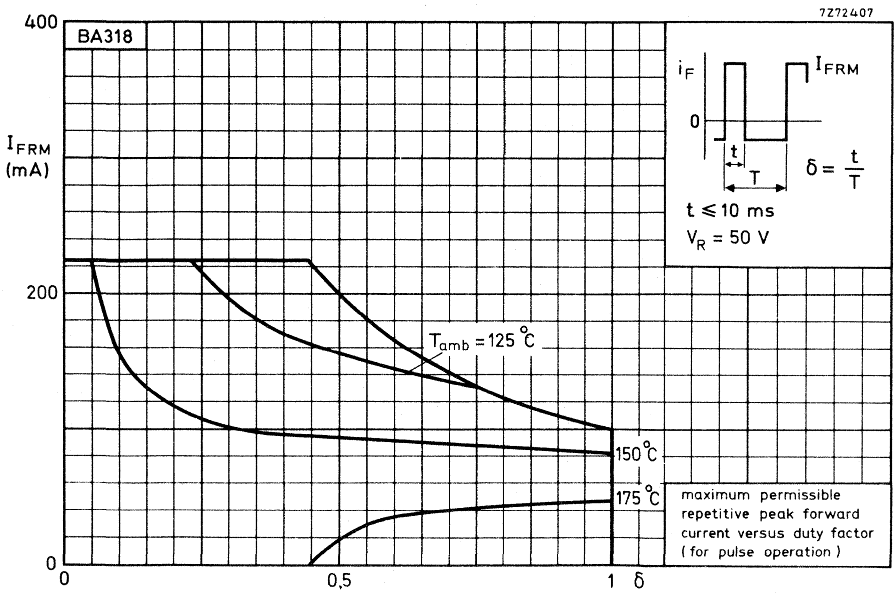

7Z72407
BA318
400
200
0
I_{FRM} (mA)
0
0,5
1
δ
T_{amb} = 125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ⩽ 10 ms
V_R = 50 V
maximum permissible
repetitive peak forward
current versus duty factor
(for pulse operation)

Fig. 6.

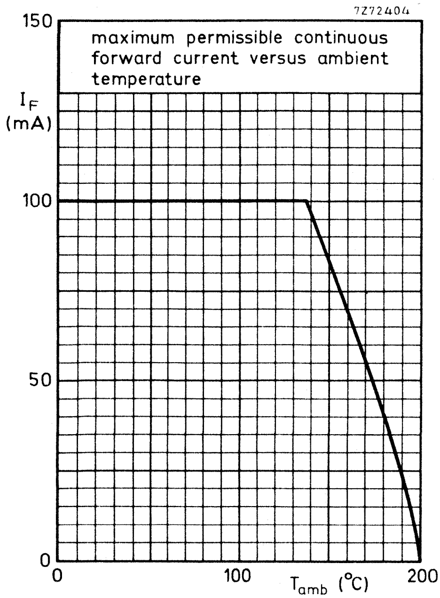


Fig. 7.

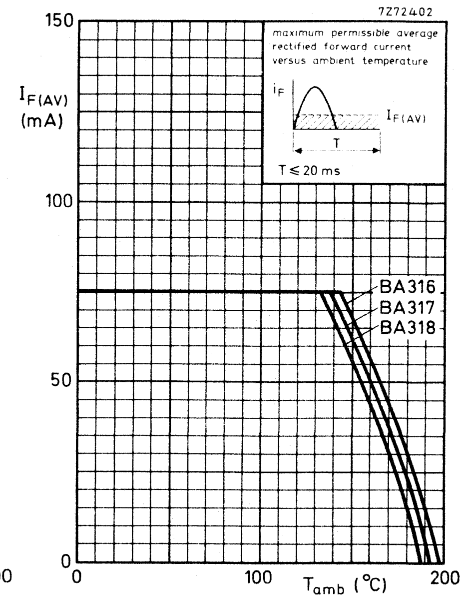


Fig. 8.

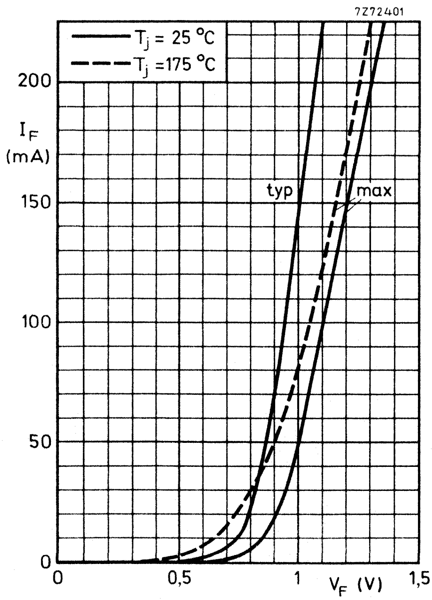


Fig. 9.

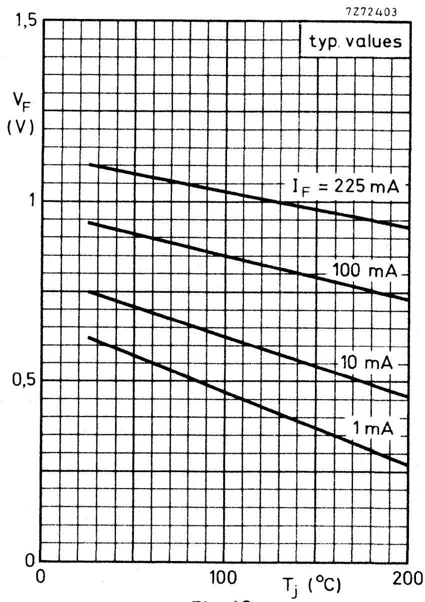


Fig. 10.

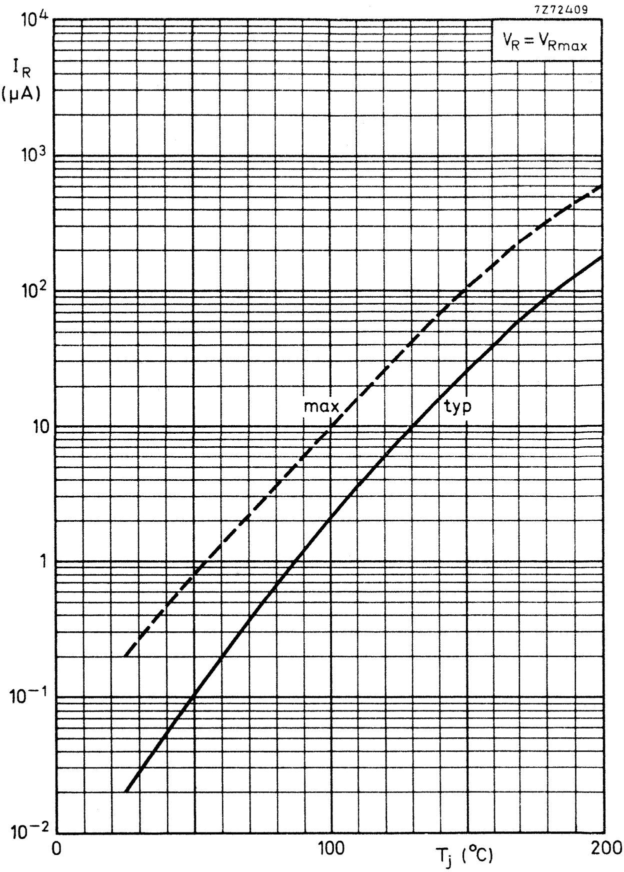

7Z72409
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

Fig. 11.

SILICON A.M. BAND SWITCHING DIODE

The BA423 is a switching diode in **hermetically sealed glass DO-34 envelope.** Intended for band switching in a.m. radio receivers.

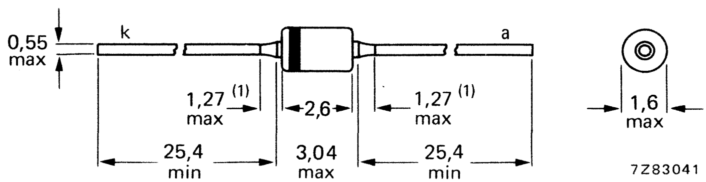
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	50 mA
Junction temperature	T_j	max.	150 °C
Diode capacitance at f = 1 MHz V_R = 3 V	C_d	<	2,5 pF
Series resistance at f = 1 MHz I_F = 10 mA	r_s	<	1,2 Ω

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)

Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	50 mA
Storage temperature	T_{stg}	−65 to + 150 °C	
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a printed-circuit board at a lead-length of 10 mm	$R_{th\,j\text{-}a}$	=	0,4 K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 50 mA	V_F	<	0,9 V
Reverse current			
V_R = 20 V	I_R	<	100 nA
V_R = 20 V; T_j = 125 °C	I_R	<	5 μA
Diode capacitance at f = 1 MHz			
V_R = 3 V	C_d	<	2,5 pF
Series resistance			
I_F = 10 mA; f = 1 MHz	r_s	<	1,2 Ω

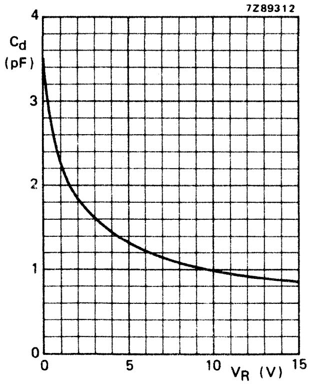


Fig. 2 Typical values
f = 1 MHz; T_j = 25 °C.

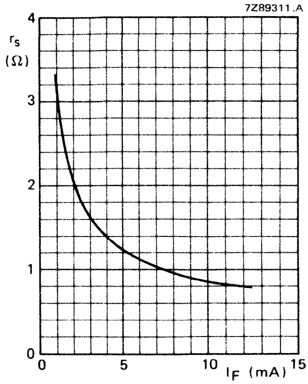


Fig. 3 Typical values
f = 1 MHz; T_j = 25 °C.

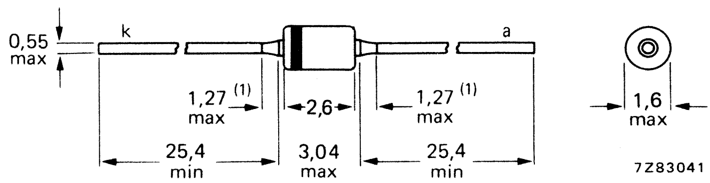
U.H.F. MIXER DIODE

Silicon epitaxial Schottky-barrier diode in a miniature DO-34 envelope and intended for mixer applications in u.h.f. tuners, t.v. modulators and r.f. detectors.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	4 V
Forward current (d.c.)	I_F	max.	30 mA
Forward voltage at I_F = 1 mA	V_F	max.	280 mV
Junction temperature	T_j	max.	100 °C

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



(1) Lead diameter in this zone uncontrolled.
The cathode is indicated by a coloured band.

The diodes are suitable for mounting on a 2 E (5,08 mm) pitch.

RATINGS

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

Continuous reverse voltage	V_R	max.	4	V
Reverse voltage (peak value)	V_{RM}	max.	5	V
Forward current (d.c.)	I_F	max.	30	mA
Storage temperature	T_{stg}	−65 to	+ 125	°C
Junction temperature	T_j	max.	100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	max.	0,32	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Forward voltage				
I_F = 1 mA	V_F	⩽	280	mV
I_F = 10 mA	V_F	⩽	430	mV
Reverse current				
V_R = 4 V	I_R	⩽	200	μA
V_R = 4 V; T_{amb} = 60 °C	I_R	⩽	2	mA
Series resistance				
I_F = 5 mA; f = 1 kHz	r_s	⩽	15	Ω
Noise figure at f = 900 MHz*	F	⩽	9	dB
Diode capacitance				
V_R = 0,2 V; f = 1 MHz	C_d	⩽	1,2	pF

* The local oscillator is adjusted for a diode current of 2 mA.
I.F. amplifier noise F_{if} = 1,5 dB; f = 35 MHz.

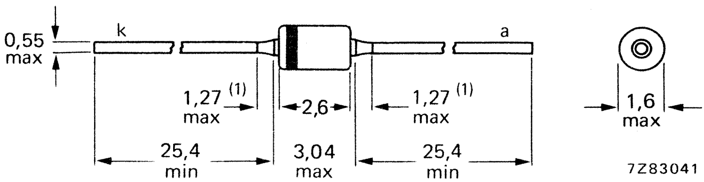
U.H.F. MIXER DIODE

Silicon epitaxial Schottky-barrier diode in a DO-34 envelope and intended for mixer applications in u.h.f. tuners, t.v. modulators and r.f. detectors.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	4	V
Forward current (d.c.)	I_F	max.	30	mA
Noise figure at f = 900 MHz	F	<	8	dB
Junction temperature	T_j	max.	100	^oC

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



(1) Lead diameter in this zone uncontrolled.
The cathode is indicated by a coloured band.

The diodes are suitable for mounting on a 2 E (5,08 mm) pitch.

RATINGS

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

Continuous reverse voltage I_R = 10 μA	V_R	max.	4 V
→ Reverse voltage (peak value)	V_{RM}	max.	5 V
Forward current (d.c.)	I_F	max.	30 mA
Storage temperature	T_{stg}	−65 to + 125	°C
→ Junction temperature	T_j	max.	100 °C

→ THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	max.	0,32 K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

→ Forward voltage			
I_F = 1 mA	V_F	<	450 mV
I_F = 10 mA	V_F	<	600 mV
→ Reverse current			
V_R = 4 V;	I_R	<	10 μA
V_R = 4 V; T_{amb} = 60 °C	I_R	<	100 μA
→ Series resistance I_F = 5 mA; f = 1 kHz	r_s	<	13 Ω
Noise figure at f = 900 MHz*	F	<	8 dB
Diode capacitance V_R = 0; f = 1 MHz	C_d	<	1,1 pF

* The local oscillator is adjusted for a diode current of 2 mA.
I.F. amplifier noise F_{if} = 1,5 dB; f = 35 MHz.

SILICON PLANAR DIODES

Switching diodes in the subminiature DO-34 glass envelope, intended for band switching in v.h.f. television tuners. Special feature of the diodes is their low capacitance.

QUICK REFERENCE DATA

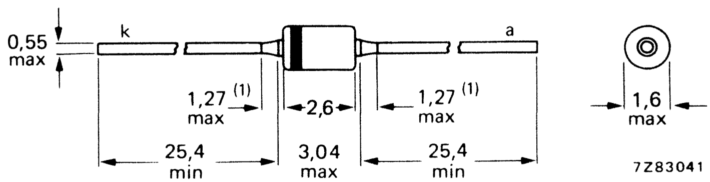
Continuous reverse voltage	V_R	max.	35 V
Forward current (d.c.)	I_F	max.	100 mA
Junction temperature	T_j	max.	150 °C

			BA482	BA483	BA484	
Diode capacitance						
V_R = 3 V; f = 1 to 100 MHz	C_d	<	1,2	1,0	1,6	pF
Series resistance at f = 200 MHz						
I_F = 3 mA	r_D	<	0,7	1,2	1,2	Ω
I_F = 10 mA	r_D	typ.	0,4	0,5	0,5	Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by coloured band.

BA482: red on a natural background.

BA483: orange on a natural background.

BA484: yellow on a natural background.

RATINGS

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

Continuous reverse voltage	V_R	max.	35 V
Forward current (d.c.)	I_F	max.	100 mA
Storage temperature	T_{stg}	–65 to + 150 °C	
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient mounted on printed board lead length = 5,0 mm	$R_{th\ j\text{-}a}$	=	0,6 °C/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 100 mA	V_F	<	1,2 V
Reverse current			
V_R = 20 V	I_R	<	100 nA
V_R = 20 V; T_{amb} = 75 °C	I_R	<	1 µA

			BA482	BA483	BA484	
Diode capacitance V_R = 3 V; f = 1 to 100 MHz	C_d	typ.	0,8	0,7	1,0	pF
		<	1,2	1,0	1,6	pF
Series resistance at f = 200 MHz I_F = 3 mA	r_D	typ.	0,6	0,8	0,8	Ω
		<	0,7	1,2	1,2	Ω

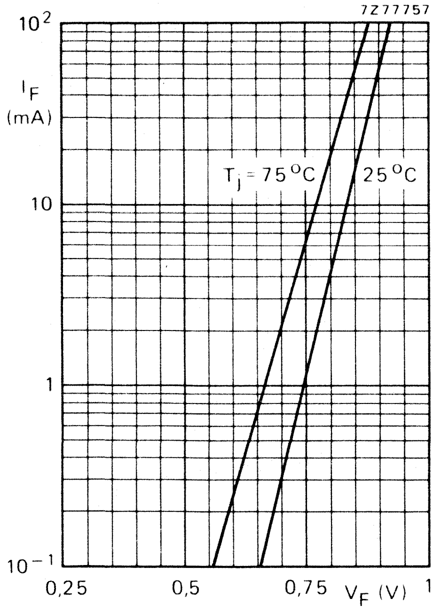


Fig. 2 Typical values.

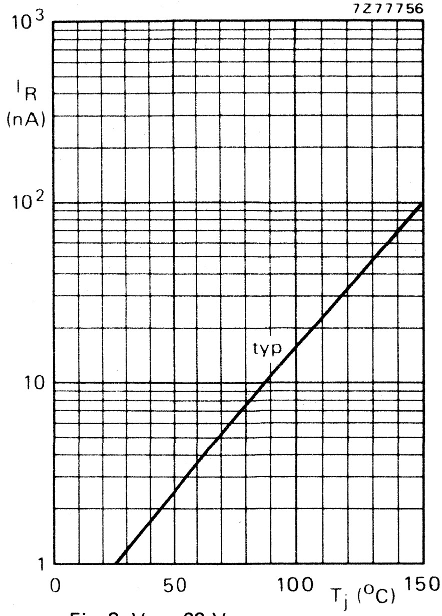


Fig. 3 $V_R = 20$ V.

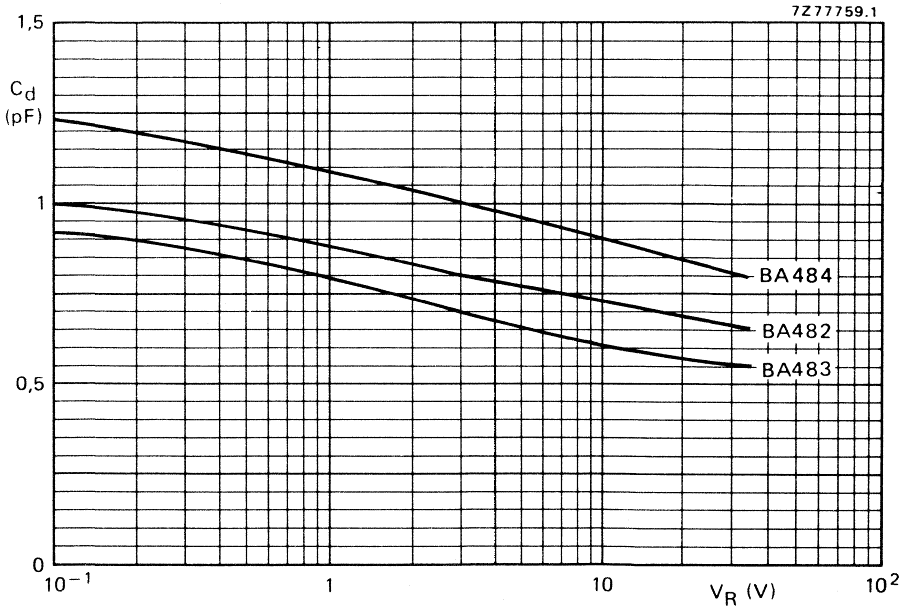


Fig. 4 Typical values; f = 1 to 100 MHz; $T_j = 25\,^oC$.

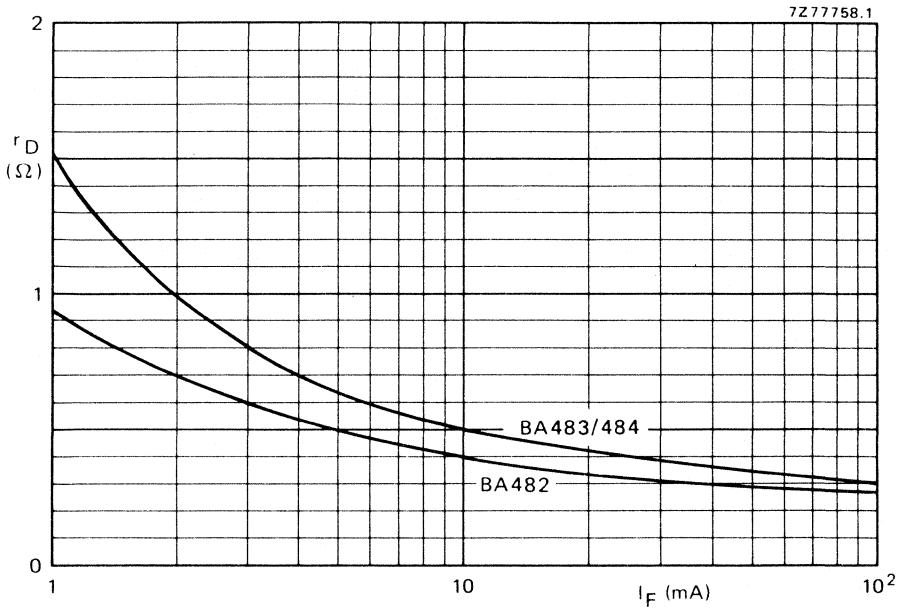


Fig. 5 Typical values; f = 200 MHz; T_j = 25 °C.

BAND-SWITCHING DIODES FOR SURFACE MOUNTING

Switching diodes in a SOD-80 envelope, intended for band switching in v.h.f. television tuners. A special feature of these diodes is their low capacitance.

These SM diodes are leadless diodes in an hermetically sealed micro-miniature glass envelope with tin-plated metal discs at each end. They are suitable for Automatic Placement and as such they can withstand immersion soldering.

The diodes are delivered in "super 8" tape.

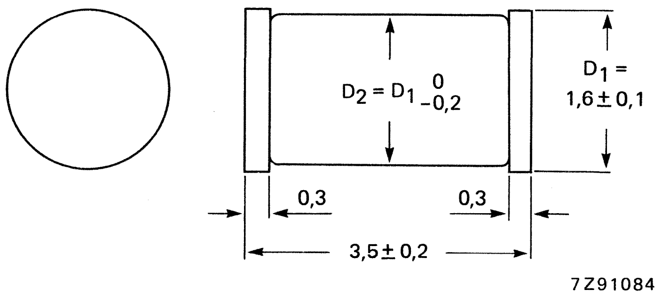
QUICK REFERENCE DATA

			BA682	BA683	
Continuous reverse voltage	V_R	max.	35	35	V
Forward current (d.c.)	I_F	max.	100	100	mA
Junction temperature	T_j	max.	150	150	^oC
Diode capacitance V_R = 3 V; f = 1 MHz	C_d	<	1,25	1,2	pF
Series resistance at f = 200 MHz I_F = 3 mA	r_D	<	0,7	1,2	Ω
I_F = 10 mA	r_D	<	0,5	0,9	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-80.



The cathode is indicated by a red band.
The BA683 cathode has an additional orange band.

RATINGS

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

Continuous reverse voltage	V_R	max.	35	V
Forward current (d.c.)	I_F	max.	100	mA
Storage temperature	T_{stg}		−65 to +150	^oC
Junction temperature	T_j		150	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6	K/mW

CHARACTERISTICS

T_j = 25 ^oC unless otherwise specified.

Forward voltage I_F = 100 mA	V_F	<	1,0	V
Reverse current V_R = 20 V	I_R	<	50	nA
V_R = 20 V; T_{amb} = 75 ^oC	I_R	<	1	μA

			BA682	BA683	
Diode capacitance at f = 1 MHz					
V_R = 1 V	C_d	<	1,5	1,5	pF
V_R = 3 V	C_d	<	1,25	1,2	pF
Series resistance at f = 200 MHz					
I_F = 3 mA	r_D	<	0,7	1,2	Ω
I_F = 10 mA	r_D	<	0,5	0,9	Ω

SILICON GLASS PASSIVATED AVALANCHE DIODE

Diode in a DO-35 envelope. It is primarily intended for general purpose applications, e.g. scan and flyback rectifiers, protection diodes etc. in television circuits. An advantage of this diode is its capability of absorbing reverse transient energy.

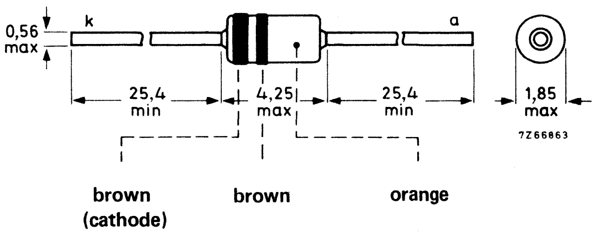
QUICK REFERENCE DATA

Working reverse voltage	V_{RW}	max.	300	V
Average rectified forward current	$I_{F(AV)}$	max.	300	mA
Non-repetitive peak forward current	I_{FSM}	max.	4	A
Repetitive peak reverse power dissipation	P_{RRM}	max.	75	W
Reverse recovery time	t_{rr}	$<$	1	μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35 (SOD-27).



RATINGS

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

Working reverse voltage	V_{RW}	max.	300 V
Continuous reverse voltage (see Fig. 8)	V_R	max.	300 V
Forward current (d.c.)	I_F	max.	350 mA
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	300 mA
Repetitive peak forward current			
t = 10 ms; f = 50 Hz	I_{FRM}	max.	900 mA
δ = 0,1; f = 15 kHz	I_{FRM}	max.	2 A
Non-repetitive peak forward current			
(t = 10 ms; half sine-wave) T_j = 150 °C prior to surge	I_{FSM}	max.	4 A
(t = 10 µs; square wave) T_j = 150 °C prior to surge	I_{FSM}	max.	30 A
Repetitive peak reverse current t = 10 µs (square wave; f = 50 Hz) T_{amb} = 25 °C	I_{RRM}	max.	150 mA
Repetitive peak reverse power dissipation t = 10 µs (square wave; f = 50 Hz) T_{amb} = 25 °C	P_{RRM}	max.	75 W
Storage temperature	T_{stg}	−65 to + 150 °C	
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient in free air mounted on printed board at 8 mm lead length	$R_{th\ j\text{-}a}$	=	0,34 °C/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 300 mA	V_F	<	1,1 V
I_F = 900 mA	V_F	<	1,3 V
Reverse avalanche breakdown voltage I_R = 100 µA	$V_{(BR)R}$	>	300 V
Reverse current			
V_R = 300 V	I_R	<	100 nA
V_R = 300 V; T_j = 125 °C	I_R	<	20 µA
Diode capacitance at f = 1 MHz			
V_R = 0	C_d	typ.	10 pF
V_R = 50 V	C_d	typ.	1,5 pF
Reverse recovery when switched from I_{FM} = 400 mA to V_R = 30 V; with $-dI_F/dt$ = 400 mA/µs			
Recovery charge	Q_s	typ.	70 nC
Recovery time	t_{rr}	<	1 µs
Maximum slope of reverse recovery current when switched from I_{FM} = 400 mA to V_R = 30 V; with $-dI_F/dt$ = 400 mA/µs	$\lvert dI_R/dt \rvert$	typ.	2,0 A/µs

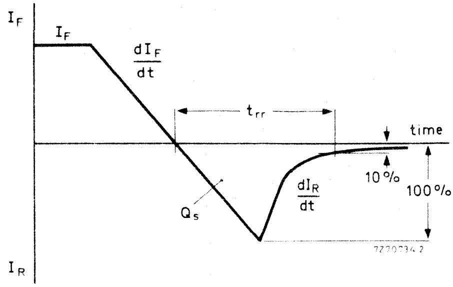


Fig. 2 Definitions of Q_s, t_{rr} and dI_R/dt.

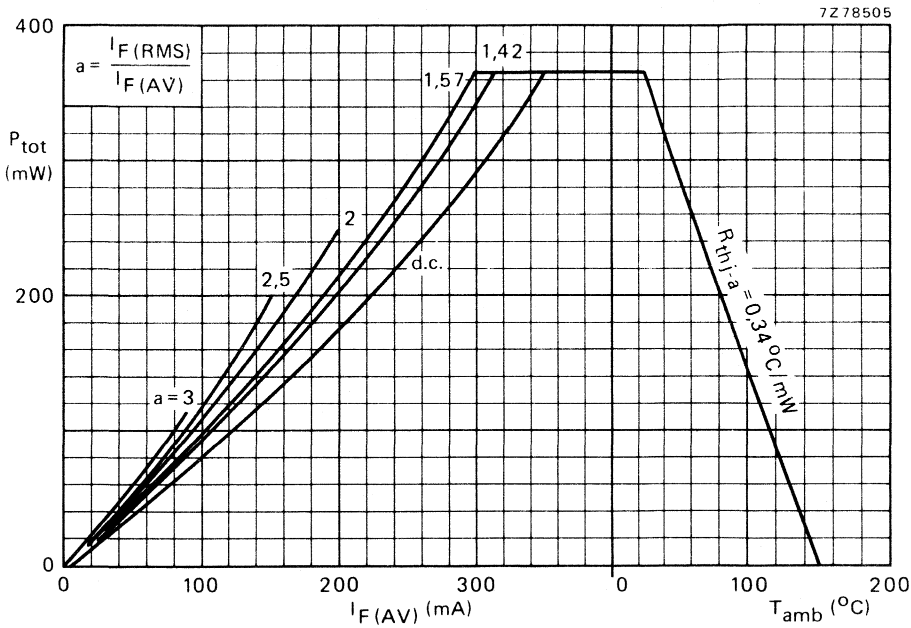


Fig. 3.

From the left-hand graph the total power dissipation can be found as a function of the average output current.

The parameter $a = \frac{I_{F(RMS)}}{I_{F(AV)}}$ depends on $n\omega R_L C_L$ and $\frac{R_t + r_{diff}}{nR_L}$ and can be found from existing graphs.

Once the power dissipation is known, the maximum permissible ambient temperature follows from the right-hand graph.

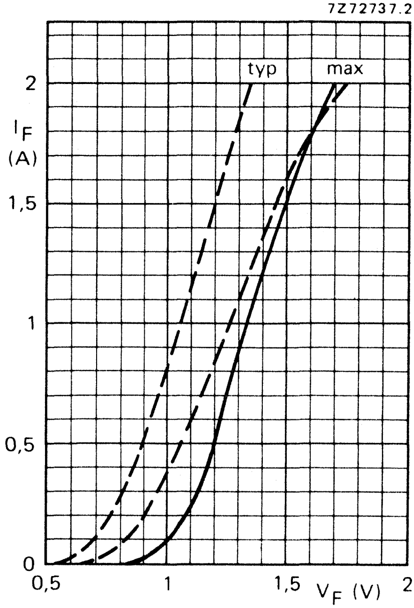


Fig. 4 —— T_j = 25 °C; – – – T_j = 150 °C.

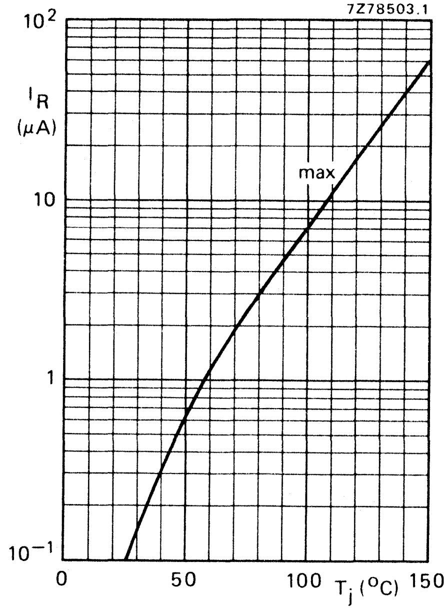


Fig. 5 V_R = 300 V.

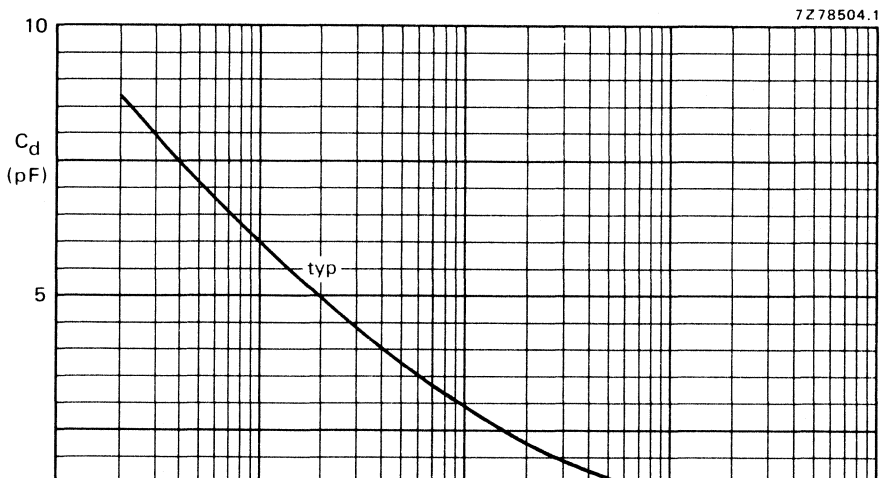


Fig. 6 f = 1 MHz; T_j = 25 °C.

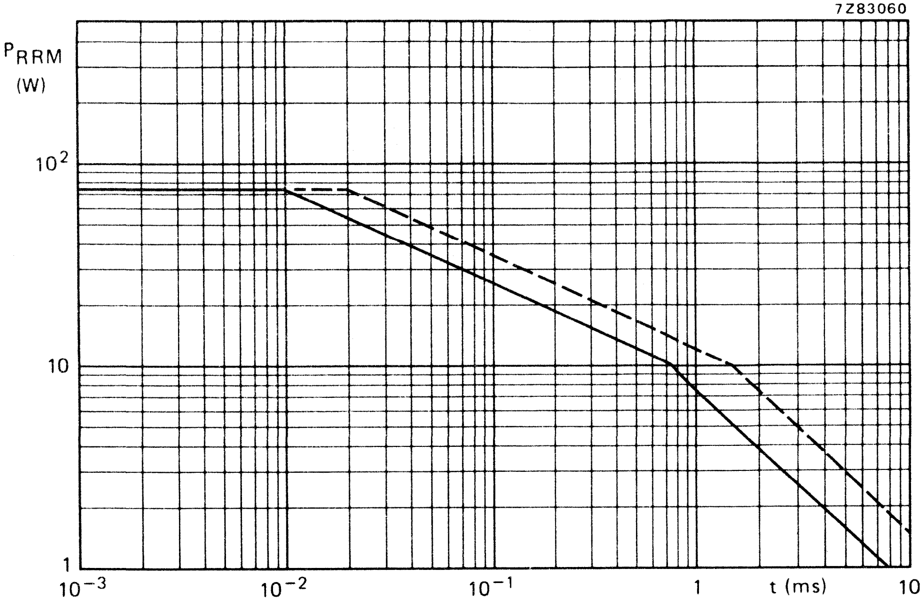


Fig. 7 Maximum permissible repetitive peak reverse power as a function of pulse duration. $T \geqslant 20$ ms; $T_j = 25$ °C. ——— rectangular waveform, $\delta \leqslant 0{,}01$; – – – triangular waveform, $\delta \leqslant 0{,}02$.

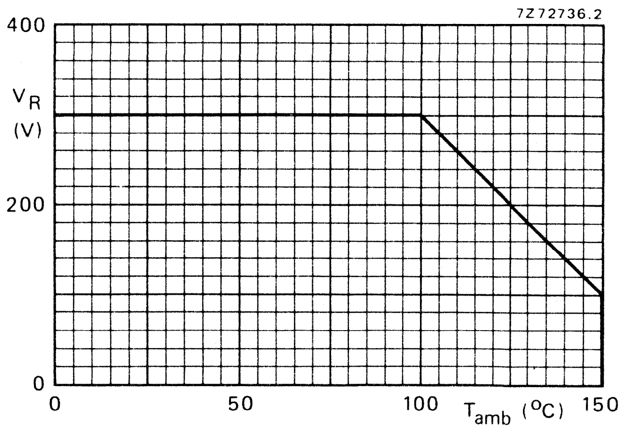


Fig. 8 Maximum permissible continuous reverse voltage versus ambient temperature.

SILICON DIODE

Diode in a DO-34 envelope intended for general purpose applications. Because of its smallness the BAS15 is specially suitable for hybrid mounting, as protection diode in reed relays, etc.

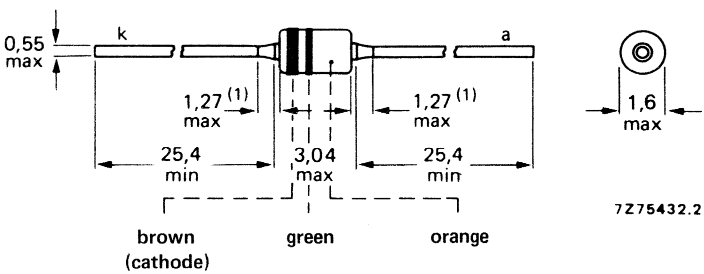
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max	50	V
Repetitive peak forward current	I_{FRM}	max	225	mA
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,60	°C/mW
Forward voltage at				
I_F = 1 mA	V_F	<	0,7	V
I_F = 10 mA	V_F	<	0,85	V
I_F = 100 mA	V_F	<	1,1	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

RATINGS

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

Continuous reverse voltage	V_R	max	50	V
Repetitive peak reverse voltage	V_{RRM}	max	50	V
Average rectified forward current * (averaged over any 20 ms period)	$I_{F(AV)}$	max	100	mA
Forward current (d.c.)	I_F	max	100	mA
Repetitive peak forward current	I_{FRM}	max	225	mA
Non-repetitive peak forward current				
t = 1 μs	I_{FSM}	max	2000	mA
t = 1 s	I_{FSM}	max	500	mA
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,60	°C/mW

CHARACTERISTICS

T_j = 25 °C

Forward voltage				
I_F = 1 mA	V_F	<	0,7	V
I_F = 10 mA	V_F	<	0,85	V
I_F = 100 mA	V_F	<	1,1	V
Reverse current				
V_R = 30 V	I_R	<	50	nA
V_R = 50 V	I_R	<	200	nA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2	pF

* For sinusoidal operation $I_{F(AV)}$ = 75 mA.

CHARACTERISTICS (continued)

Reverse recovery time when switched from
I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; T_j = 25 °C;
Measured at I_R = 1 mA — t_{rr} < 4 ns

Test circuit and waveforms:

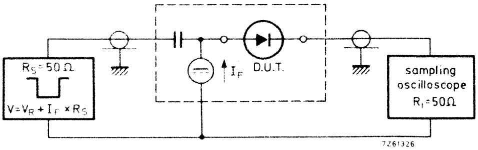
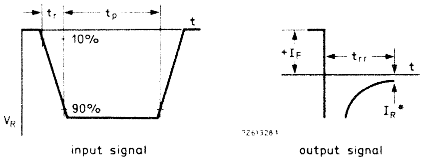


Fig. 2 Test circuit.



* I_R = 1 mA

Fig. 3 Waveforms.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODE

Silicon epitaxial high-speed diode in a microminiature plastic envelope. It is intended for high-speed switching in hybrid thick and thin-film circuits.

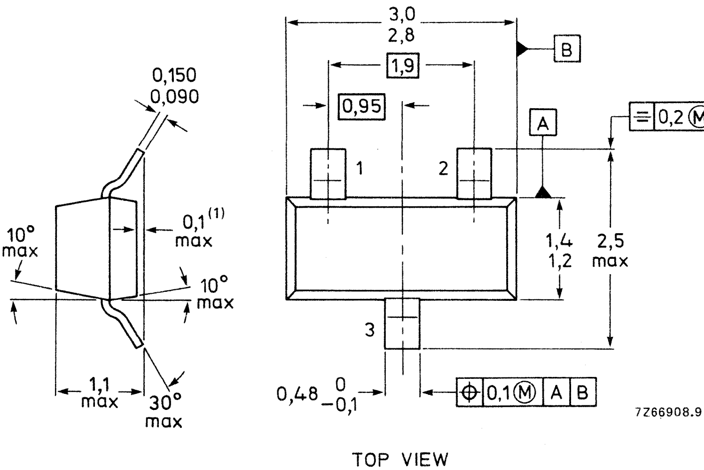
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	85	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Junction temperature	T_j	max.	175	°C
Forward voltage at I_F = 50 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

MECHANICAL DATA

Dimensions in mm

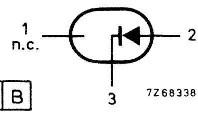
Fig. 1 SOT-23.



(1) Also available in 0,1 — 0,2 mm version.

Marking code

BAS16 = A6



See also *Soldering recommendations.*

RATINGS

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

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	85	V
Average rectified forward current ▲ (averaged over any 20 ms period) up to T_{amb} = 25 °C**	$I_{F(AV)}$	max.	250	mA
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL CHARACTERISTICS *

$T_j = Px\,(R_{th\,j\text{-}t} + R_{th\,t\text{-}s} + R_{th\,s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\,j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\,t\text{-}s}$	=	280	K/W
From soldering points to ambient **	$R_{th\,s\text{-}a}$	=	90	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Forward voltage				
I_F = 1 mA	V_F	<	715	mV
I_F = 10 mA	V_F	<	855	mV
I_F = 50 mA	V_F	<	1000	mV
I_F = 150 mA	V_F	<	1250	mV
Reverse current				
V_R = 25 V; T_j = 150 °C	I_R	<	30	μA
V_R = 75 V	I_R	<	1	μA
V_R = 75 V; T_j = 150 °C	I_R	<	50	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2	pF
Forward recovery voltage (see also Fig. 2) when switched to I_F = 10 mA; t_p = 20 ns	V_{fr}	<	1,75	V
Reverse recovery time (see also Fig. 3) when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge (see also Fig. 4) when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

▲ Measured under pulse conditions. $t_p \leq$ 0,5 ms. $I_{F(AV)}$ = 150 mA, $t_{(av)} \leq$ 1 ms, for sinusoidal operation.

* See *Thermal characteristics*.

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

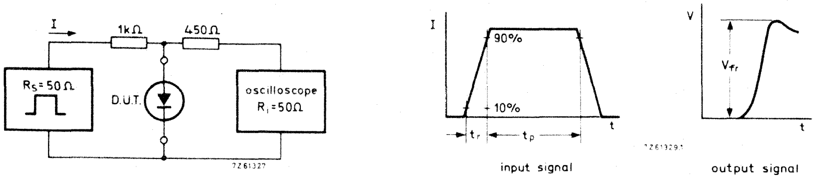


Fig. 2 Forward recovery voltage test circuit and waveforms.

Input signal: forward pulse rise time = t_r = 20 ns; forward current pulse duration t_p = 120 ns; duty factor = δ = 0,01.
Oscilloscope: rise time = t_r = 0,35 ns.
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

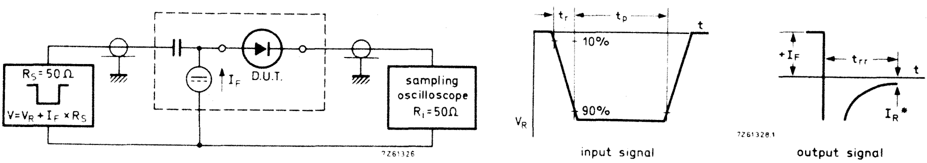


Fig. 3 Reverse recovery time test circuit and waveforms.

Input signal: reverse pulse rise time = t_r = 0,6 ns; reverse pulse duration = t_p = 100 ns; duty factor = δ = 0,05. * t_{rr} up to I_R = 1 mA.
Oscilloscope: rise time = t_r = 0,35 ns.
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

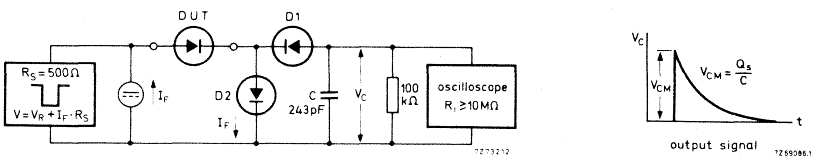


Fig. 4 Recovery charge test circuit and waveform.

D1 = BAW62; D2 = diode with minority carrier life time at 10 mA: < 200 ps
Input signal

Rise time of the reverse pulse	t_r	=	2	ns
Reverse pulse duration	t_p	=	400	ns
Duty factor	δ	=	0,02	

Circuit capacitance C ≤ 7 pF (C = oscilloscope input capacitance + parasitic capacitance).

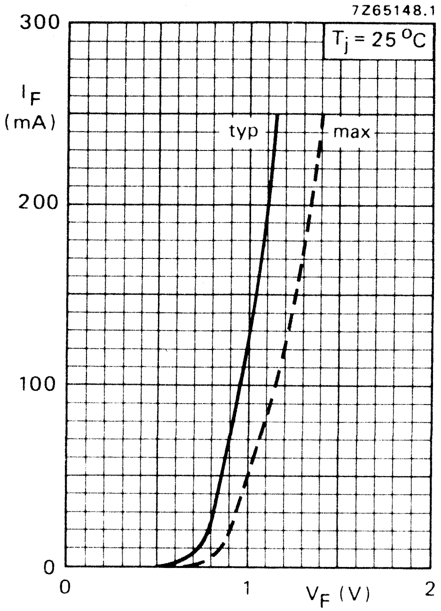


Fig. 5.

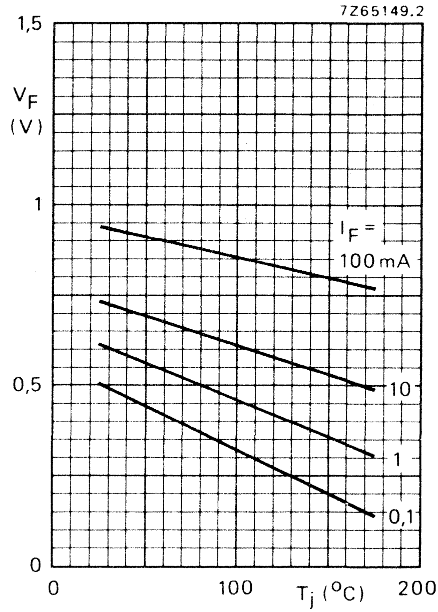


Fig. 6 Typical values.

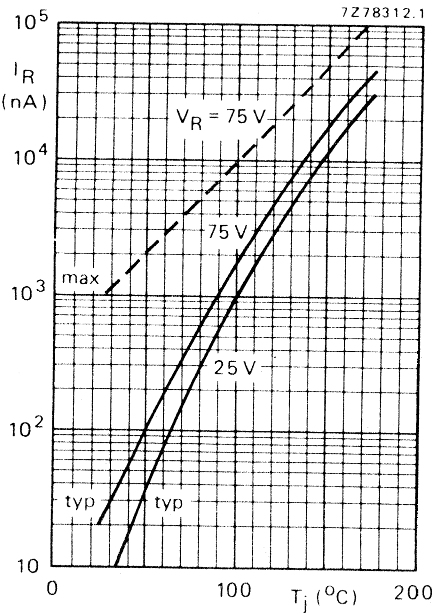


Fig. 7.

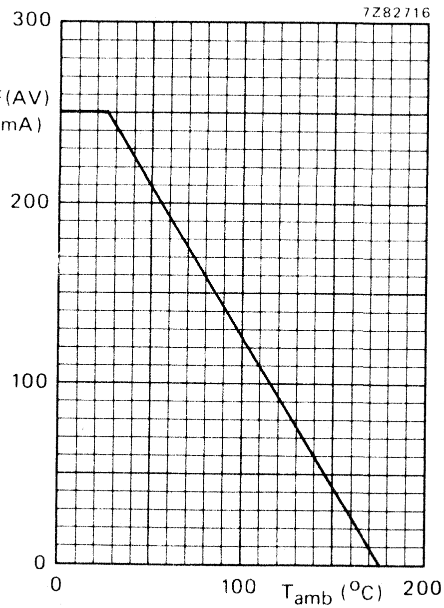


Fig. 8 Current derating curve.

LOW VOLTAGE STABISTOR

Silicon planar epitaxial diode in SOT-23 envelope. This diode is intended for low voltage stabilizing e.g. bias stabilizer in class-B output stages, clipping, clamping and meter protection.

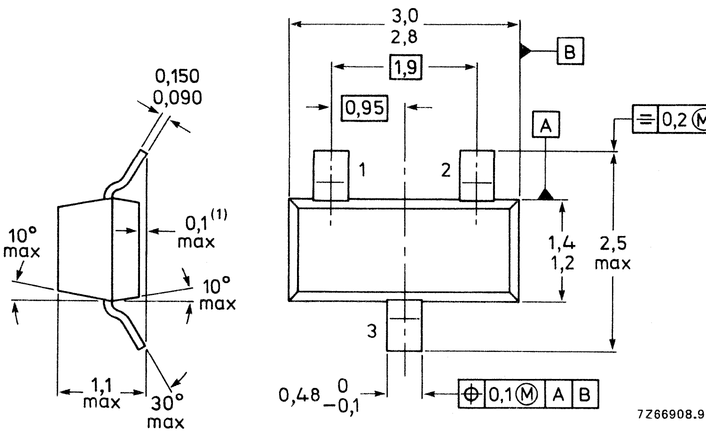
QUICK REFERENCE DATA

Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}		−65 to + 150	°C
Junction temperature	T_j	max.	175	°C
Forward voltage				
I_F = 0,1 mA	V_F		580 to 660	mV
I_F = 1,0 mA	V_F		665 to 745	mV
I_F = 10 mA	V_F		750 to 830	mV
I_F = 100 mA	V_F		870 to 960	mV
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	140	pF

MECHANICAL DATA

Dimensions in mm

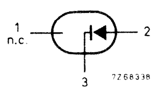
Fig. 1 SOT-23.



TOP VIEW

Marking code

BAS17 = A91



(1) Also available in 0,1 – 0,2 mm version.

See also chapter *Soldering Recommendations*.

RATINGS

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

Repetitive peak forward current **	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}	−65 to + 150		°C
Junction temperature	T_j	max.	175	°C

THERMAL CHARACTERISTICS*

$T_j = Px\ (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280	K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90	K/W

CHARACTERISTICS

$T_j = 25\ ^{\circ}C$ unless otherwise specified

→ Forward voltage				
$I_F = 0{,}1$ mA	V_F		580 to 660	mV
$I_F = 1{,}0$ mA	V_F		665 to 745	mV
$I_F = 5{,}0$ mA	V_F		725 to 805	mV
$I_F = 10$ mA	V_F		750 to 830	mV
$I_F = 100$ mA	V_F		870 to 960	mV
Reverse current				
$V_R = 4$ V	I_R	<	5	μA
Temperature coefficient				
$I_F = 1$ mA	S_F	typ.	−1,8	mV/K
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	140	pF

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

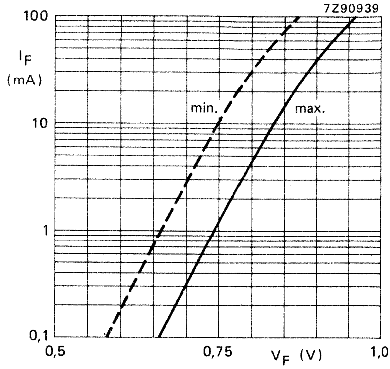


Fig. 2 Forward current as a function of forward voltage.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODES

Silicon epitaxial high-speed diodes in a microminiature plastic envelope. They are intended for switching and general purposes.

QUICK REFERENCE DATA

			BAS19	BAS20	BAS21	
Continuous reverse voltage	V_R	max.	100	150	200	V
Repetitive peak reverse voltage	V_{RRM}	max.	120	200	250	V
Repetitive peak forward current	I_{FRM}	max.		625		mA
Junction temperature	T_j	max.		150		^oC
Forward voltage at I_F = 100 mA	V_F	<		1		V
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω measured at I_R = 3 mA	t_{rr}	<		50		ns

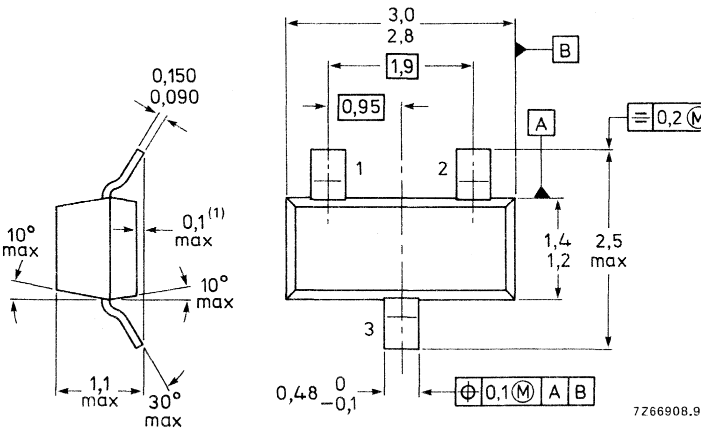
MECHANICAL DATA

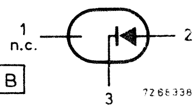
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAS19 = A8
BAS20 = A81
BAS21 = A82





(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations.*

RATINGS

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

			BAS19	BAS20	BAS21	
Continuous reverse voltage	V_R	max.	100	150	200	V
Repetitive peak reverse peak	V_{RRM}	max.	120	200	250	V
Average rectified forward current (1) (averaged over any 20 ms period)	$I_{F(AV)}$	max.		200		mA
Forward current (d.c.) up to T_{amb} = 25 °C**	I_F	max.		200		mA
Repetitive peak forward current	I_{FRM}	max.		625		mA
Storage temperature	T_{stg}			−65 to + 150		°C
Junction temperature	T_j	max.		150		°C
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		200		mW

THERMAL CHARACTERISTICS*

$T_j = P \times (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280	K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

Forward voltage				
I_F = 100 mA	V_F	<	1,0	V
I_F = 200 mA	V_F	<	1,25	V
Reverse breakdown voltage (1)				
BAS19; I_R = 100 μA	$V_{(BR)R}$	>	120	V
BAS20; I_R = 100 μA	$V_{(BR)R}$	>	200	V
BAS21; I_R = 100 μA (2)	$V_{(BR)R}$	>	250	V
Reverse current				
$V_R = V_{Rmax}$	I_R	<	100	nA
$V_R = V_{Rmax}$; T_j = 150 °C	I_R	<	100	μA
Differential resistance				
I_F = 10 mA	r_{diff}	typ.	5	Ω

(1) Measured under pulse conditions; Pulse time = $t_p \leq 0{,}3$ ms.
(2) At zero life time, measured under pulse conditions to avoid excessive dissipation and voltage limited to 275 V.
* See *Thermal characteristics.*
→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

Diode capacitance			
V_R = 0; f = 1 MHz	C_d	<	5 pF
Reverse recovery time (see Figs 2 and 3) when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50 ns

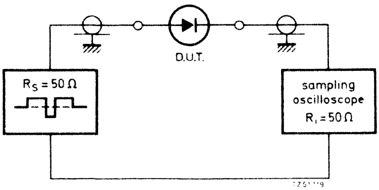


Fig. 2 Test circuit.

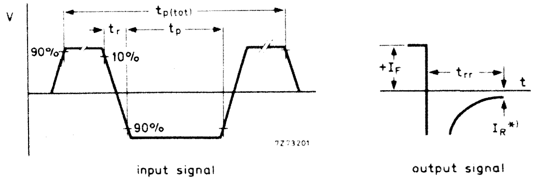


Fig. 3 Waveforms; I_R = 3 mA.

Input signal		
total pulse duration	$t_{p(tot)}$	= 2 μs
duty factor	δ	= 0,0025
rise time of reverse pulse	t_r	= 0,6 ns
reverse pulse duration	t_p	= 100 ns
Oscilloscope		
rise time	t_r	= 0,35 ns
circuit capacitance*	C	< 1 pF

*C = oscilloscope input capacitance + parasitic capacitance.

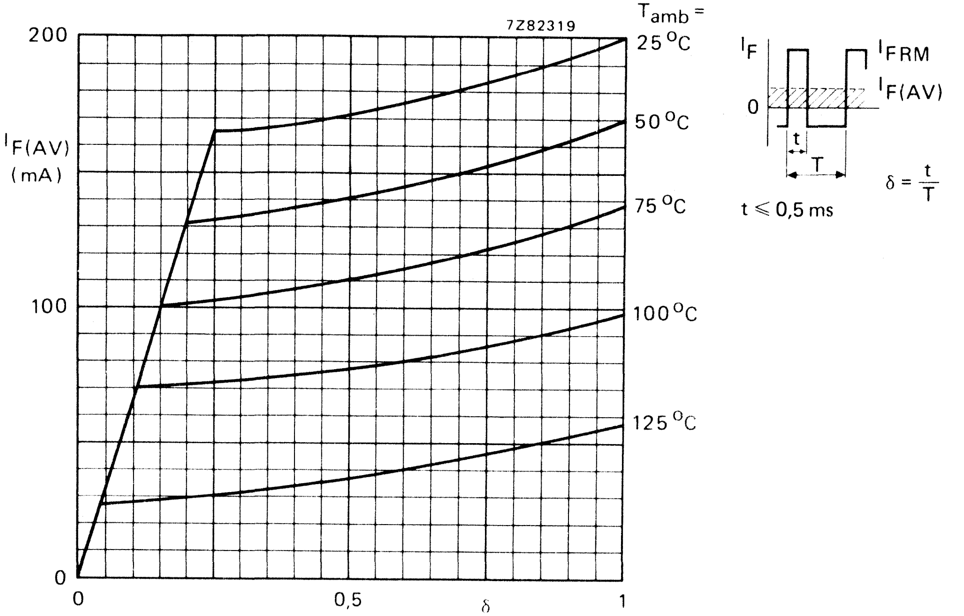


Fig. 4 BAS19; maximum permissible average rectified forward current for pulse operation as a function of the duty factor at V_R = 100 V.

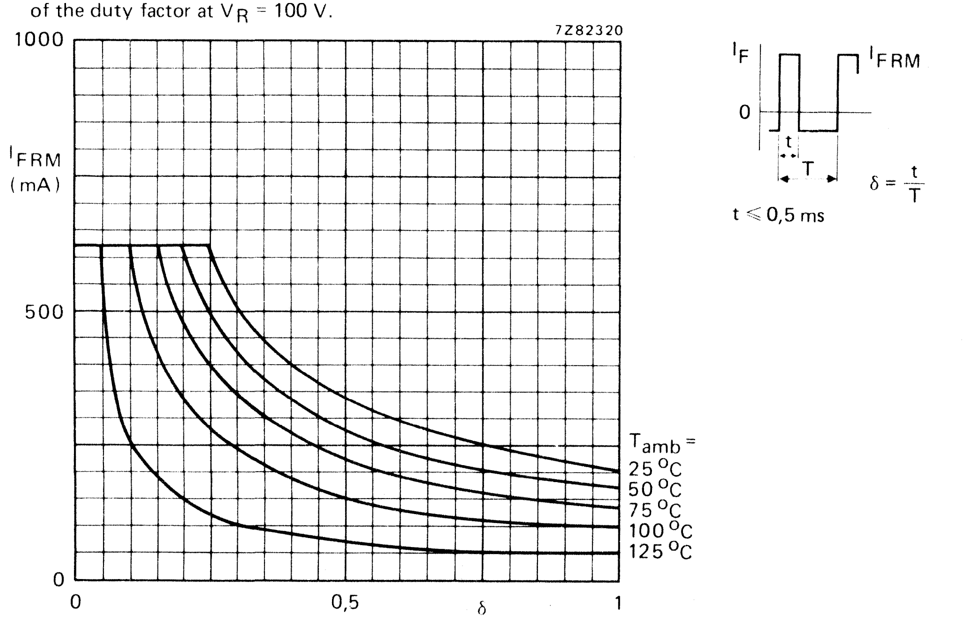


Fig. 5 BAS19; maximum permissible repetitive peak forward current for pulse operation as a function of the duty factor at V_R = 100 V.

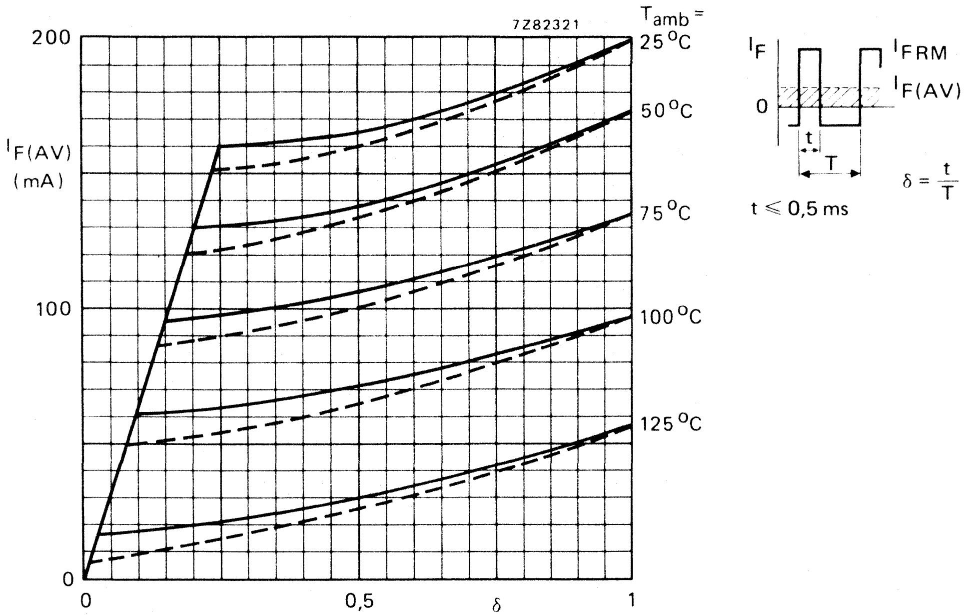


Fig. 6 BAS20/21; maximum permissible average rectified forward current for pulse operation as a function of the duty factor.

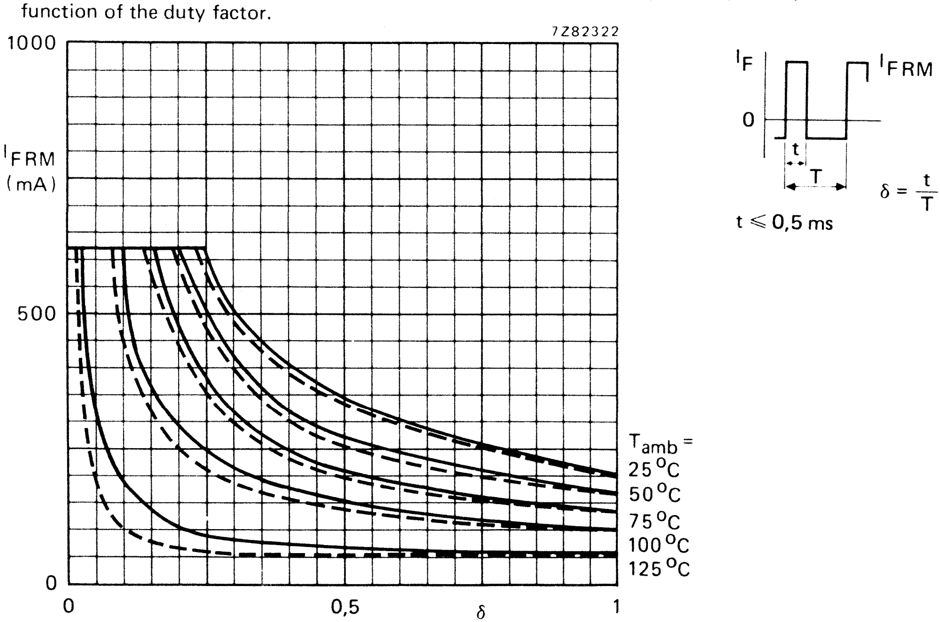


Fig. 7 BAS20/21; maximum permissible repetitive peak forward current for pulse operation as a function of the duty factor.

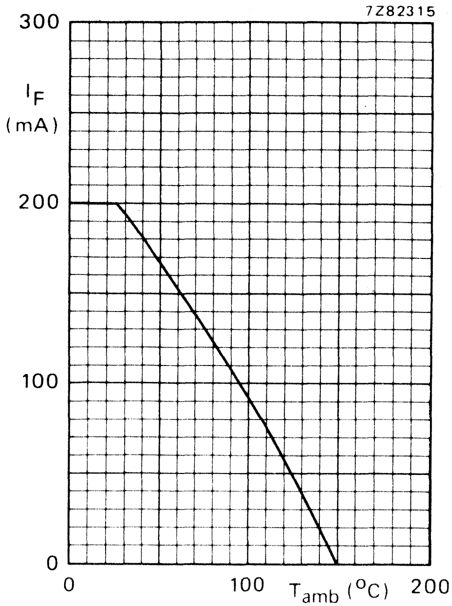


Fig. 8.

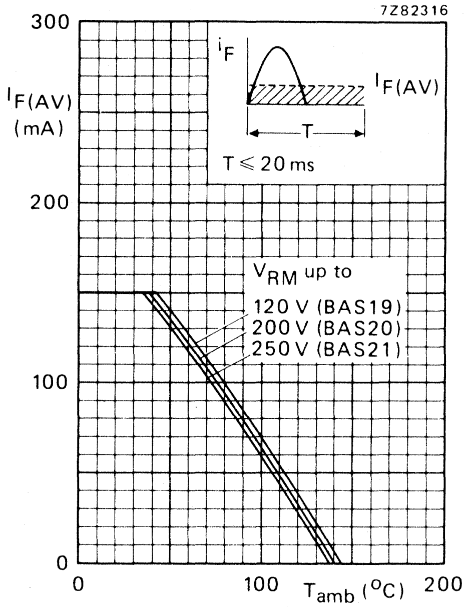


Fig. 9.

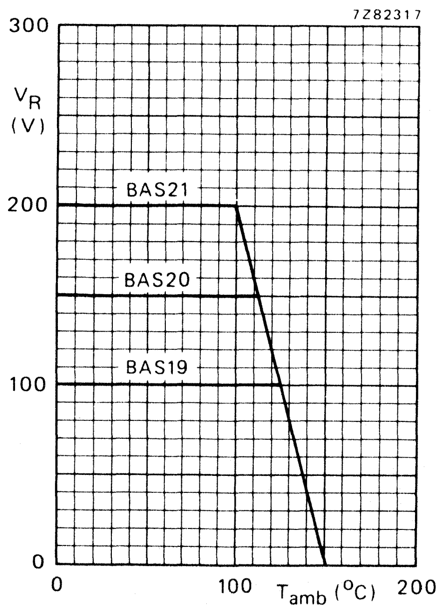


Fig. 10.

Fig. 8 Maximum permissible continuous forward current as a function of the ambient temperature.

Fig. 9 Maximum permissible average rectified forward current as a function of the ambient temperature.

Fig. 10 Maximum permissible continuous reverse voltage as a function of the ambient temperature.

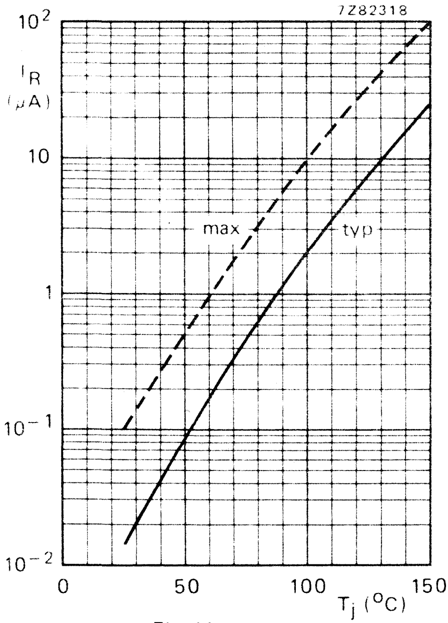


Fig. 11.

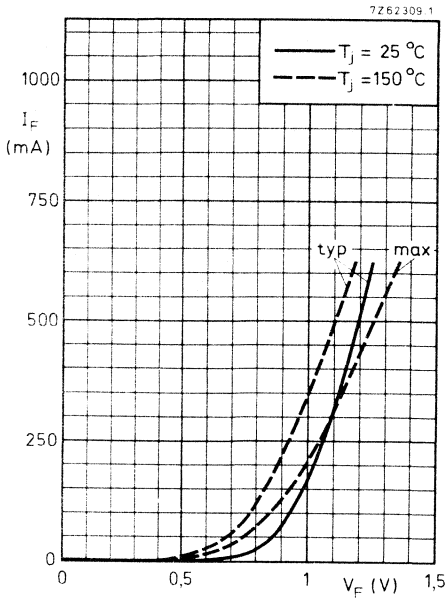


Fig. 12.

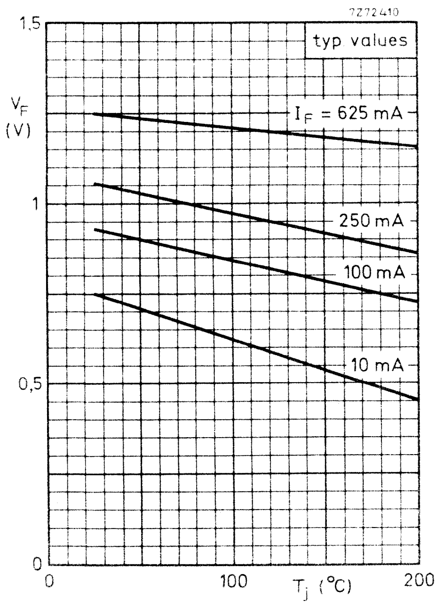


Fig. 13.

Fig. 11 Continuous reverse current as a function of the junction temperature.

Fig. 12 Forward current as a function of forward voltage.

Fig. 13 Forward voltage as a function of the junction temperature.

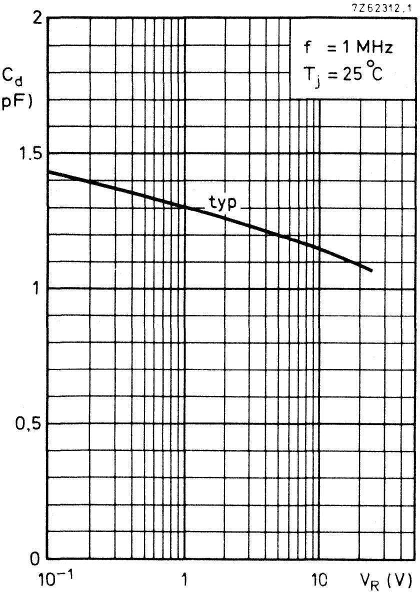

7Z62312.1
f = 1 MHz
T_j = 25 °C
C_d
(pF)
typ
2
1.5
1
0,5
0
10^{-1}
1
10
V_R (V)

Fig. 14.

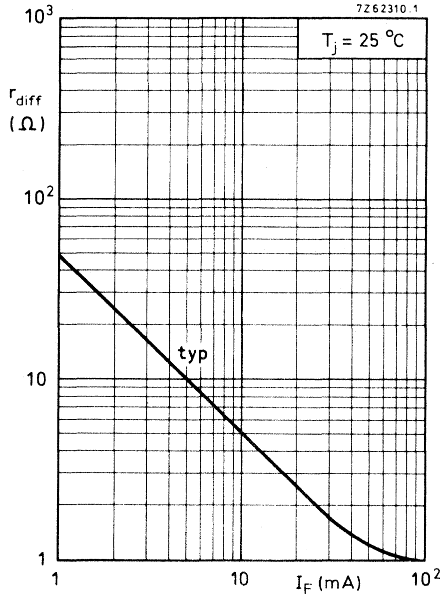

7Z62310.1
T_j = 25 °C
r_{diff}
(Ω)
typ
10^3
10^2
10
1
1
10
I_F (mA)
10^2

Fig. 15.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODE

The BAS28 consists of two separate diodes in one microminiature envelope intended for surface mounting.

It concerns fast-switching general-purpose diodes.

QUICK REFERENCE DATA

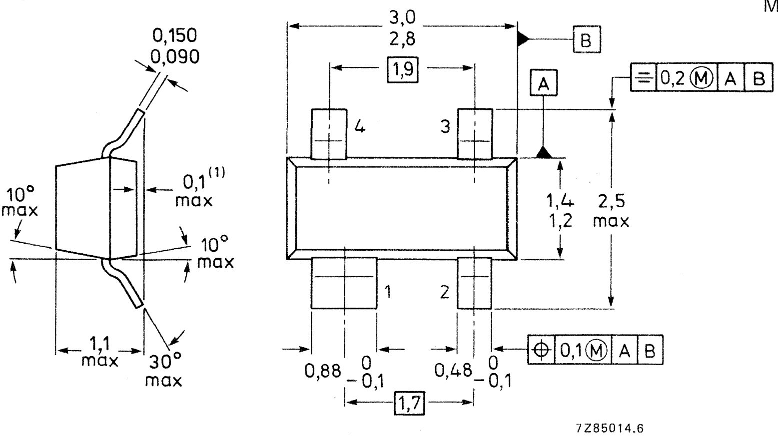
Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	85	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Junction temperature	T_j	max.	175	°C
Forward voltage at I_F = 50 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω, measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

MECHANICAL DATA

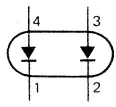
Dimensions in mm

Fig. 1 SOT-143.

Marking code. A61



TOP VIEW



(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	85	V
Average rectified forward current▲ (averaged over any 20 ms period) up to T_{amb} = 25 °C**	$I_{F(AV)}$	max.	250	mA
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}	−65 to +	175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE*

From junction to ambient	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 1 mA	V_F	<	715	mV
I_F = 10 mA	V_F	<	855	mV
I_F = 50 mA	V_F	<	1000	mV
I_F = 150 mA	V_F	<	1250	mV
Reverse current				
V_R = 25 V; T_j = 150 °C	I_R	<	30	µA
V_R = 75 V	I_R	<	1	µA
V_R = 75 V; T_j = 150 °C	I_R	<	50	µA
Diode capacitance V_R = 0; f = 1 MHz	C_d	<	2	pF
Forward recovery voltage (see also Fig. 2) when switched to I_F = 10 mA; t_p = 20 ns	V_{fr}	<	1,75	V
Reverse recovery time (see also Fig. 3) when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge (see also Fig. 4) when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

▲ Measured under pulse conditions. $t_p \leqslant$ 0,5 ms. $I_{F(AF)}$ = 150 mA, $t_{(av)} \leqslant$ 1 ms, for sinusoidal operation.

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

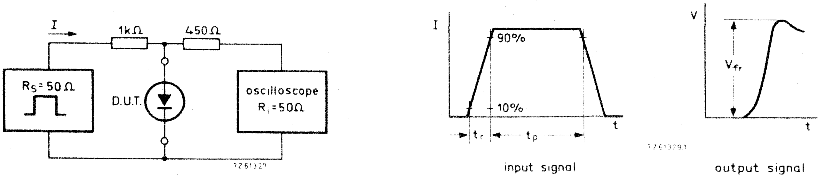


Fig. 2 Forward recovery voltage test circuit and waveforms.

Input signal: forward pulse rise time = t_r = 20 ns; forward current pulse duration t_p = 120 ns; duty factor = δ = 0,01.
Oscilloscope: rise time = t_r = 0,35 ns.
Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

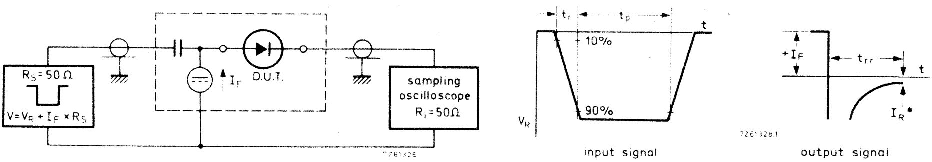


Fig. 3 Reverse recovery time test circuit and waveforms.

Input signal: reverse pulse rise time = t_r = 0,6 ns; reverse pulse duration = t_p = 100 ns; duty factor = δ = 0,05. * t_{rr} up to I_R = 1 mA.
Oscilloscope: rise time = t_r = 0,35 ns.
Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

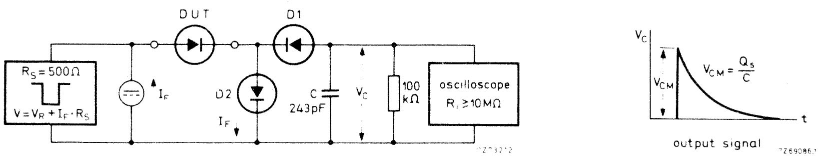


Fig. 4 Recovery charge test circuit and waveform.

D1 = BAW62; D2 = diode with minority carrier life time at 10 mA: < 200 ps

Input signal

Rise time of the reverse pulse	t_r	=	2	ns
Reverse pulse duration	t_p	=	400	ns
Duty factor	δ	=	0,02	

Circuit capacitance C ⩽ 7 pF (C = oscilloscope input capacitance + parasitic capacitance).

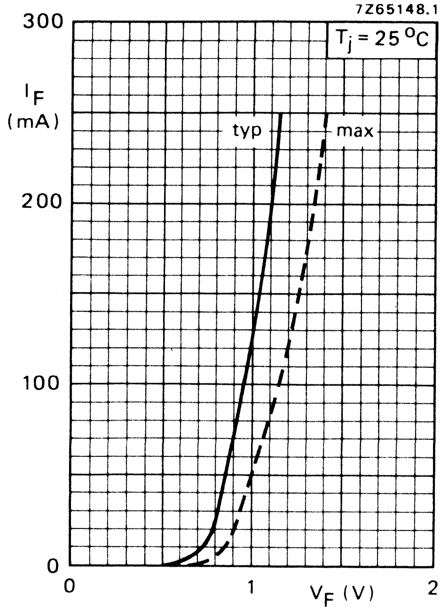


Fig. 5.

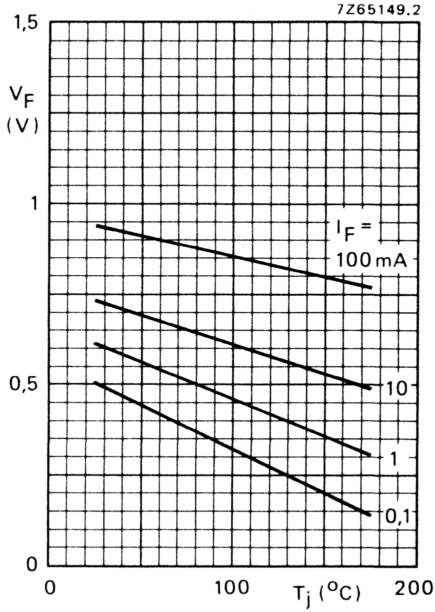


Fig. 6 Typical values.

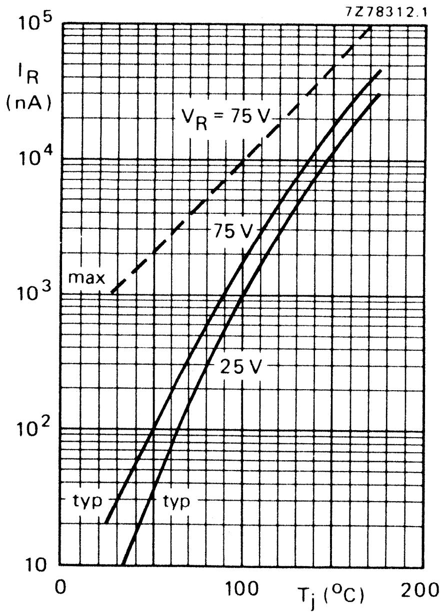


Fig. 7.

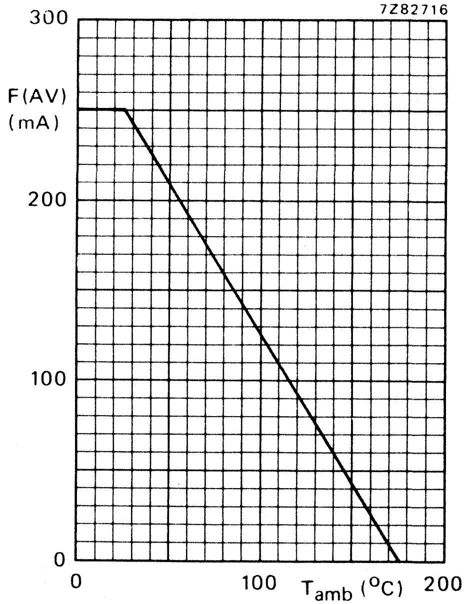


Fig. 8 Current derating curve.

CONTROLLED AVALANCHE DIODES

The BAS29, BAS31 and the BAS35 are silicon planar epitaxial diodes encapsulated in a SOT-23 envelope.

The BAS29 consists of a single diode. The BAS31 has two diodes in series and the BAS35 has two diodes with a common anode. All diodes are designed for switching inductive loads in semi-electronic telephone exchanges.

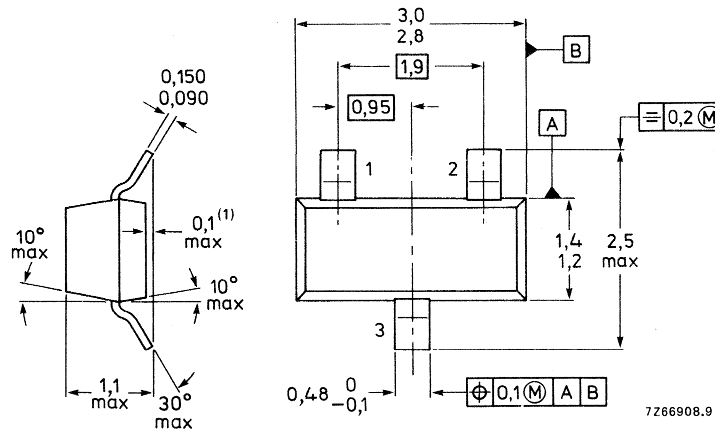
QUICK REFERENCE DATA (per diode)

Continuous reverse voltage	V_R	max.	90 V
Repetitive peak forward current	I_{FRM}	max.	600 mA
Forward current	I_F	max.	250 mA
Junction temperature	T_j	max.	150 °C
Forward voltage at I_F = 50 mA	V_F	<	0,84 V
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50 ns

MECHANICAL DATA

Fig. 1 SOT-23.

Dimensions in mm

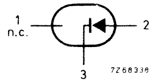


TOP VIEW

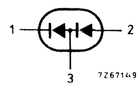
(1) Also available in 0,1 – 0,2 mm version.

Marking code:

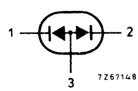
BAS29 = L20
BAS31 = L21
BAS35 = L22



BAS29



BAS31



BAS35

RATINGS (per diode)

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

Continuous reverse voltage	V_R	max.	90	V
Repetitive peak forward current	I_{FRM}	max.	600	mA
Average rectified forward current (averaged over any 20 ms period)	I_F	max.	250	mA
Non-repetitive peak forward current				
t = 1 μs; T_j = 25 °C prior to surge	I_{FSM}	max.	6	A
t = 1 s; T_j = 25 °C prior to surge	I_{FSM}	max.	1	A
Forward current (d.c.)	I_F	max.	250	mA
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	150	°C

THERMAL RESISTANCE

From junction to ambient when mounted on ceramic substrate of 7 mm x 5 mm x 0,5 mm	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS (per diode)

T_{amb} = 25 °C unless otherwise specified

Forward voltage				
I_F = 10 mA	V_F	<	0,75	V
I_F = 50 mA	V_F	<	0,84	V
I_F = 100 mA	V_F	<	0,90	V
I_F = 200 mA	V_F	<	1,00	V
I_F = 400 mA	V_F	<	1,25	V
Reverse current				
V_R = 90 V	I_R	<	100	nA
V_R = 90 V; T_j = 150 °C	I_R	<	100	μA
Reverse avalanche breakdown voltage				
→ I_R = 1 mA	$V_{(BR)R}$	>	120 to 175	V
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	typ.	....	pF
		<	35	pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50	ns

HIGH-SPEED SILICON DIODE FOR SURFACE MOUNTING

The BAS32 is a planar epitaxial high-speed diode designed for fast logic applications.

This SM diode is a leadless diode in a hermetically sealed SOD-80 envelope with tin-plated metal discs at each end. It is suitable for "automatic placement" and as such it can withstand immersion soldering.

The diodes are delivered in "super 8" tape.

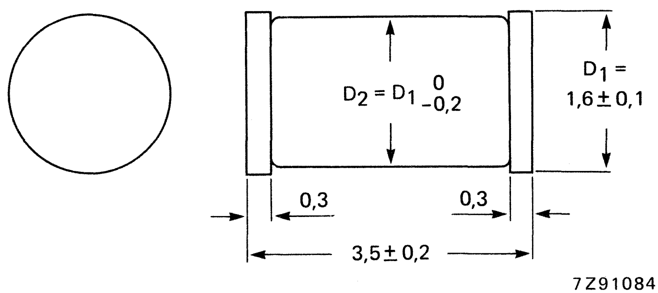
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Repetitive peak forward current	I_{FRM}	max.	450	mA
Junction temperature	T_j	max.	200	^oC
Forward voltage I_F = 100 mA	V_F	<	1	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-80.



Cathode indicated by black band.

RATINGS

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

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V*
Average rectified forward current	$I_{F(AV)}$	max.	150	mA**
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	450	mA
Non-repetitive peak forward current				
t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6	K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltages				
I_F = 5 mA	V_F	0,62 to	0,75	V
I_F = 100 mA	V_F	$<$	1,00	V
I_F = 100 mA; T_j = 100 °C	V_F	$<$	0,93	V
Reverse currents				
V_R = 20 V	I_R	$<$	25	nA
V_R = 20 V; T_j = 150 °C	I_R	$<$	50	μA
V_R = 75 V	I_R	$<$	5	μA
V_R = 75 V; T_j = 150 °C	I_R	$<$	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	$<$	2	pF
Forward recovery voltage when switched to				
I_F = 50 mA; t_r = 20 ns	V_{fr}	$<$	2,5	V

* Measured at zero life time at I_R = 100 μA; $V_R > 100$ V.

** For sinusoidal operation see Fig. 6. For pulse operation see Figs 4 and 5.

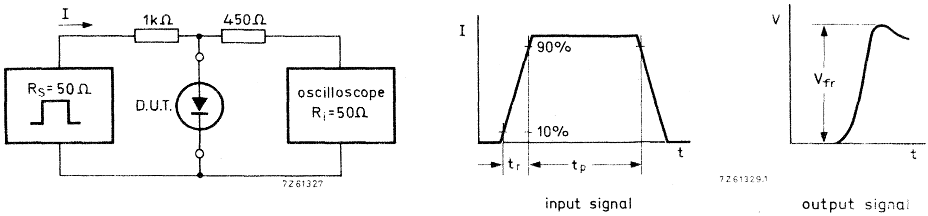


Fig. 2 Forward recovery voltage test circuit and waveforms.

Input signal : Rise time of the forward pulse t_r = 20 ns
Forward current pulse duration t_p = 120 ns
Duty factor δ = 0,01

Oscilloscope: Rise time t_r = 0,35 ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

DEVELOPMENT SAMPLE DATA

Reverse recovery time when switched from
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω;
measured at I_R = 1 mA t_{rr} < 4 ns

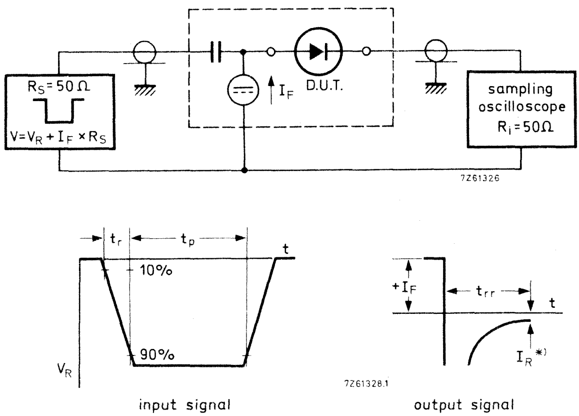


Fig. 3 Reverse recovery time test circuit and waveforms.

Input signal : Rise time of the reverse pulse t_r = 0,6 ns
Reverse pulse duration t_p = 100 ns
Duty factor δ = 0,05

* I_R = 1 mA

Oscilloscope: Rise time t_r = 0,35 ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

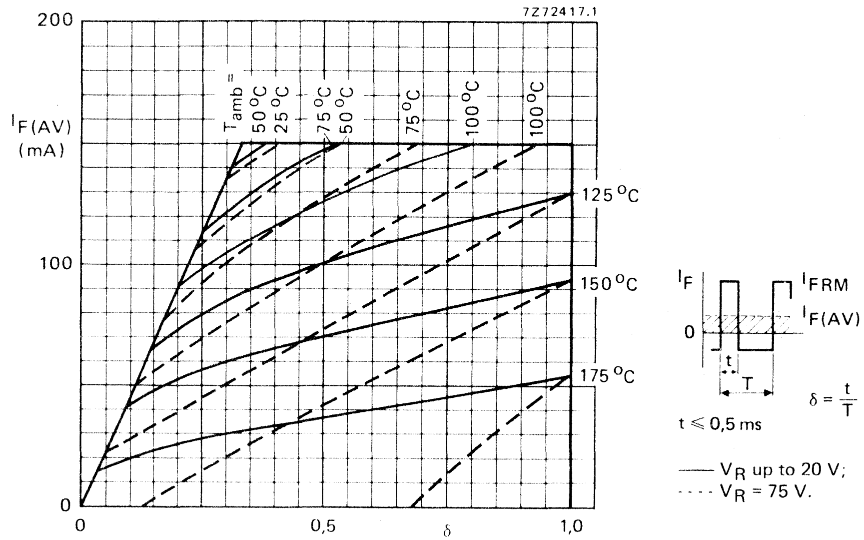


Fig. 4 Maximum permissible average rectified forward current versus duty factor (pulse operated).

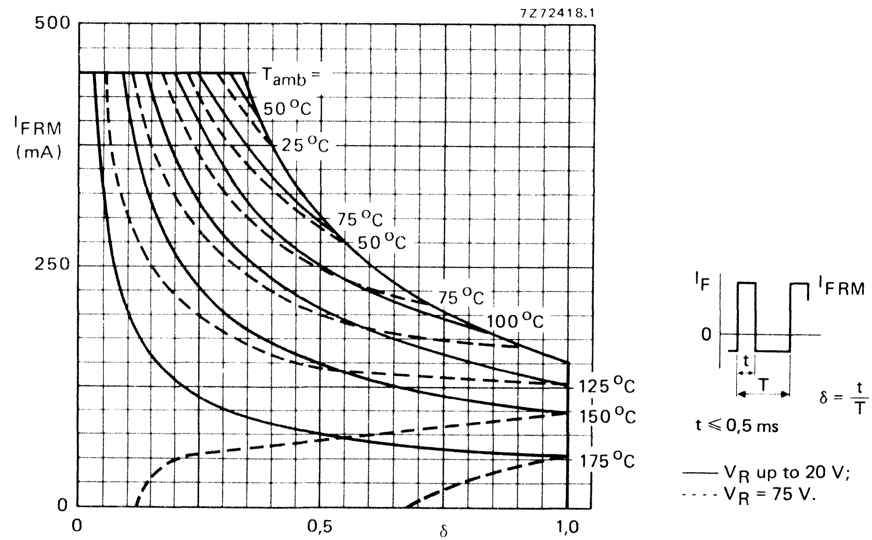


Fig. 5 Maximum permissible repetitive peak forward current versus duty factor (pulse operated).

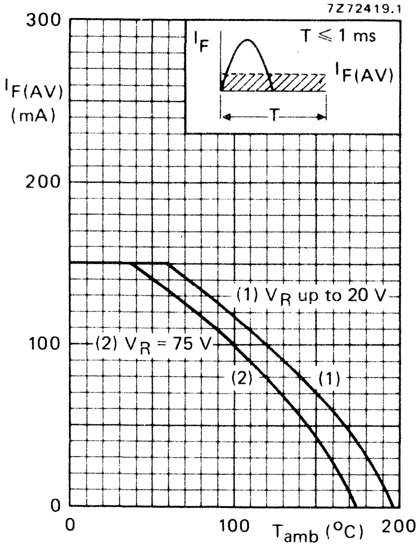


Fig. 6 Maximum permissible average rectified forward current versus ambient temperature.

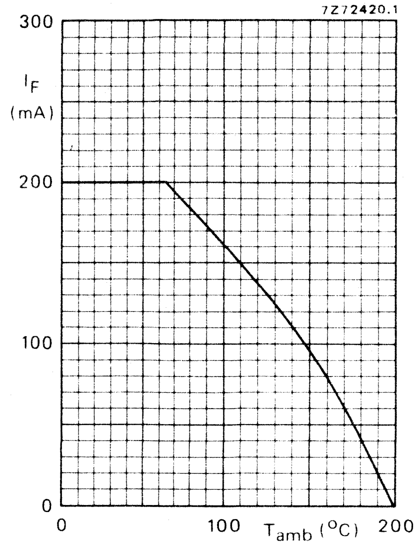


Fig. 7 Maximum permissible continuous forward current versus ambient temperature.

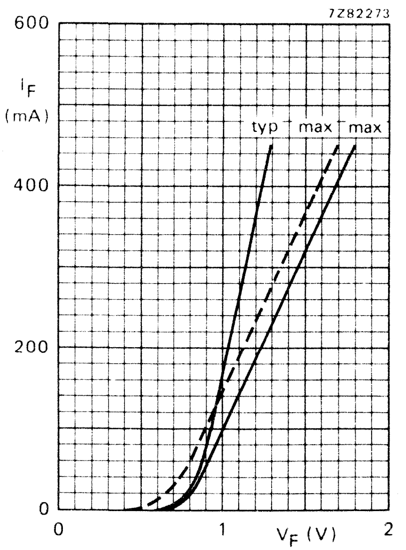


Fig. 8 Forward current versus forward voltage; ——— T_j = 25 °C; – – – T_j = 175 °C.

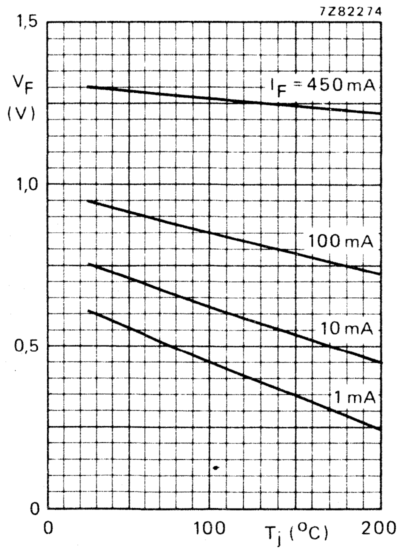


Fig. 9 Forward voltage versus junction temperature; typical values.

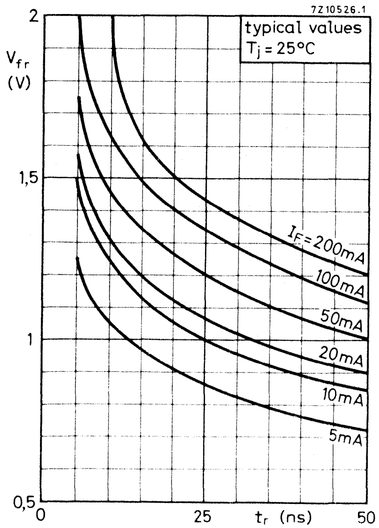


Fig. 10 Forward recovery voltage versus rise time.

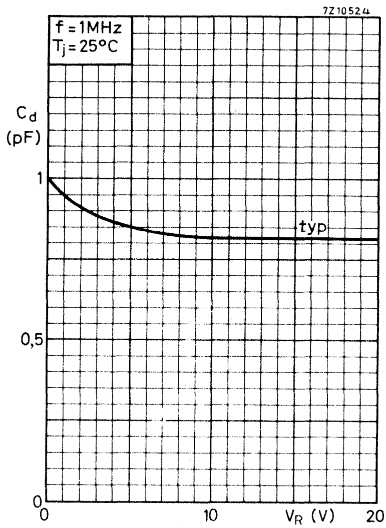


Fig. 11 Diode capacitance versus reverse voltage.

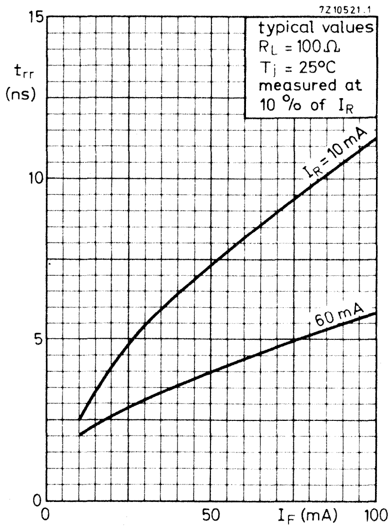


Fig. 12 Reverse recovery time versus forward current.

DEVELOPMENT SAMPLE DATA

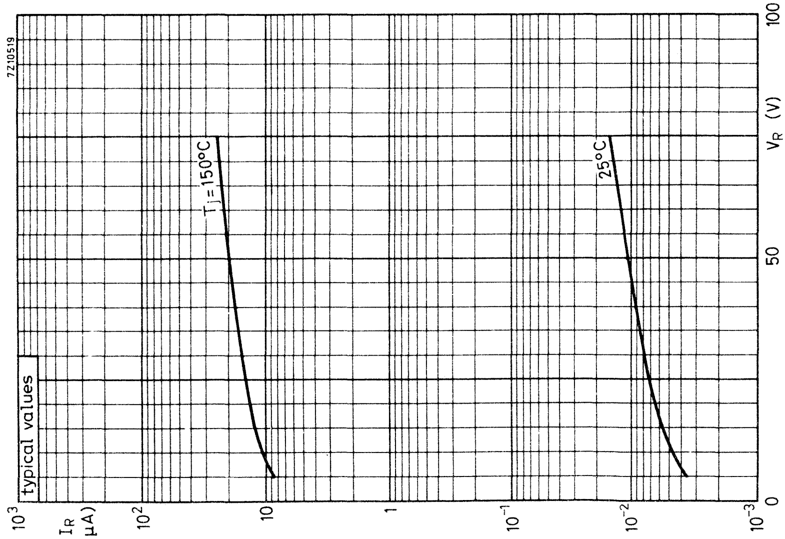


Fig. 13 Reverse current versus reverse voltage.

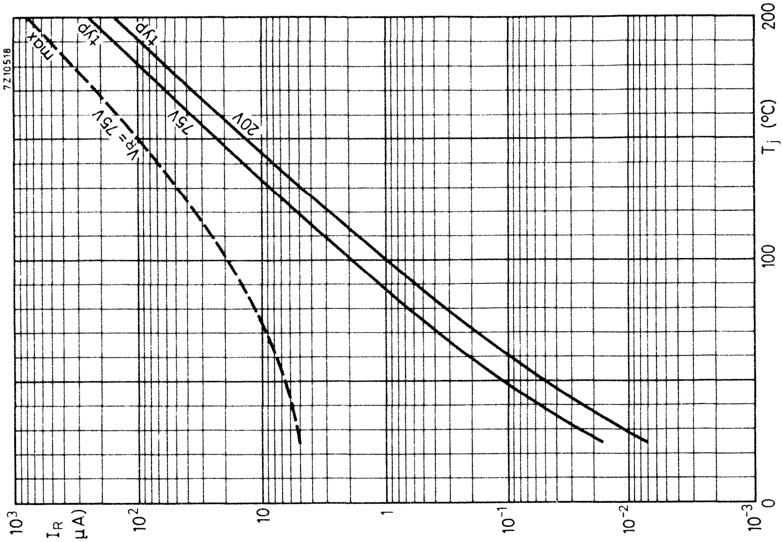


Fig. 14 Reverse current versus junction temperature.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODE

For data of this diode please refer to types BAS29/31.

LOW LEAKAGE DIODE

Switching diode with a very low reverse current, encapsulated in a subminiature glass (DO-34) envelope.

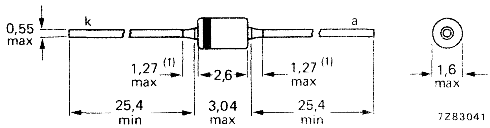
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	125 V
Forward voltage I_F = 200 mA	V_F	max.	1,0 V
Reverse current V_R = 125 V	I_R	max.	1,0 nA
Diode capacitance V_R = 0; f = 1 MHz	C_d	max.	8,0 pF

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

The cathode is indicated by a coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	125	V
Forward current (d.c.)	I_F	max.	225	mA
Repetitive peak forward current	I_{FRM}	max.	450	mA
Non-repetitive peak forward current t_p = 1 μs	I_{FSM}	max.	4	A
Storage temperature	T_{stg}		−65 to + 175	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient in free air mounted on a p.c. board with a clearance of 10 mm	$R_{th\ j\text{-}a}$ =	400	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Reverse current under maximum light conditions (illuminance = 500 lux)				
V_R = 125 V	I_R	max.	1	nA
V_R = 30 V; T_j = 125 °C	I_R	max.	300	nA
V_R = 125 V; T_j = 125 °C	I_R	max.	500	nA
Forward voltage				
I_F = 1 mA	V_F		0,64 to 0,74	V
I_F = 5 mA	V_F		0,70 to 0,80	V
I_F = 50 mA	V_F		0,74 to 0,88	V
I_F = 200 mA	V_F		0,83 to 1,00	V
Diode capacitance V_R = 0; f = 1 MHz	C_d	max.	8	pF

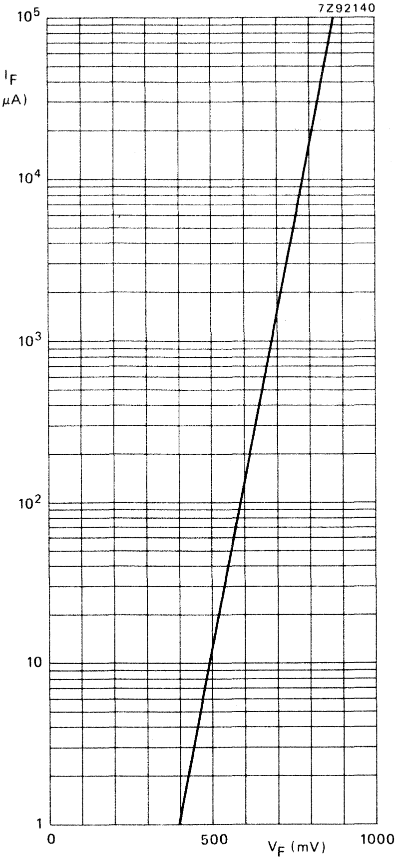


Fig. 2 T_j = 25 °C; typical values.

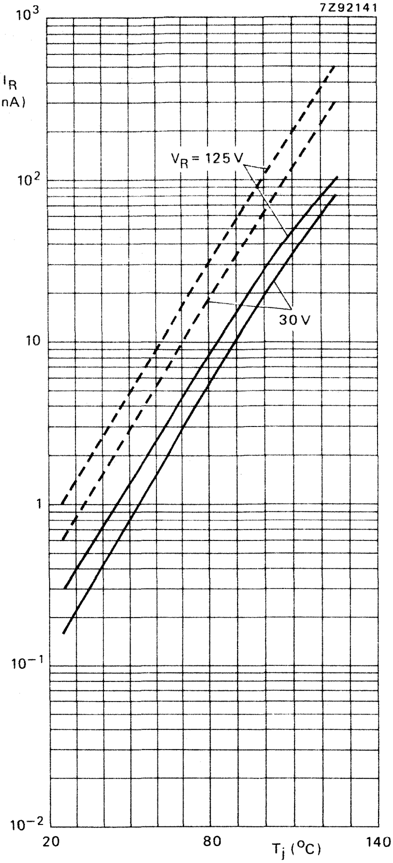


Fig. 3 – – – = max. values;
——— = typ. values.

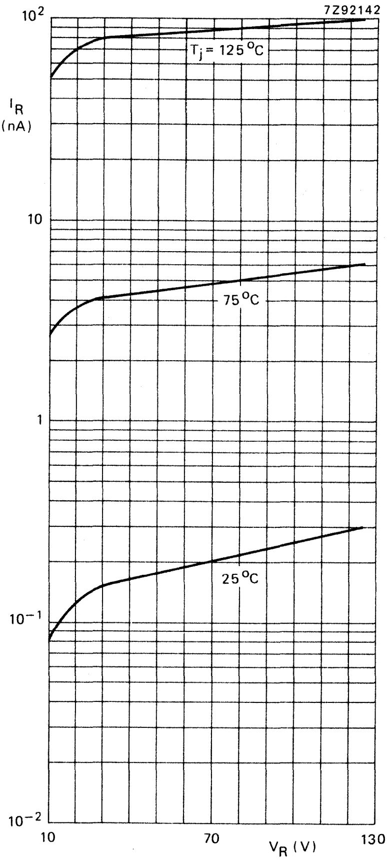


Fig. 4 Typical values.

SILICON PLANAR EPITAXIAL ULTRA-HIGH SPEED DIODE

The BAS56 consists of two separate planar epitaxial ultra-high speed, high conductance diodes in one microminiature plastic envelope intended for surface mounting.

The device is primarily intended for core gating in very fast memories using the Surface Mounted Devices (SMD) technology.

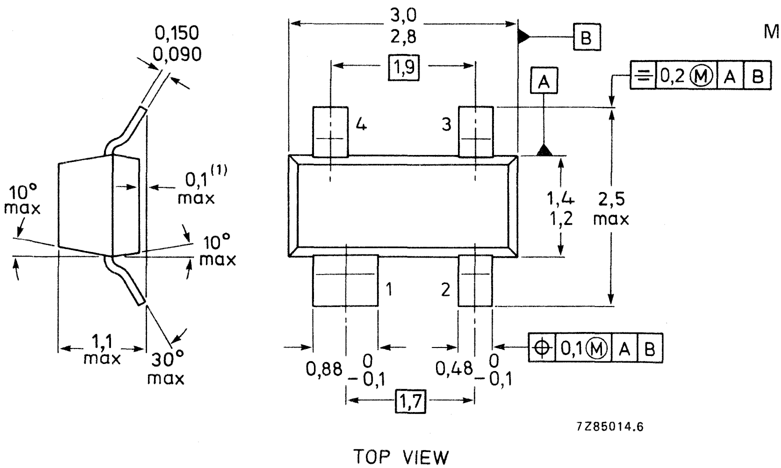
QUICK REFERENCE DATA

			single diode	series connection	
Continuous reverse voltage	V_R	max.	60	120	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	120	V
Forward current	I_F	max.	200	150	mA
Repetitive peak forward current	I_{FRM}	max.	600	430	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300		mW
Reverse recovery time when switched from I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω; measured at I_R = 40 mA	t_{rr}	<	6		ns

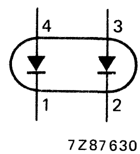
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-143.



Marking code: L51



(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

			single diode	series connection	
Continuous reverse voltage	V_R	max.	60	120	V
Repetitive peak reverse voltage*	V_{RRM}	max.	60	120	V
Forward current	I_F	max.	200	150	mA
Repetitive peak forward current	I_{FRM}	max.	600	430	mA
Non-repetitive peak forward current					
t = 1 μs	I_{FSM}	max.	4000		mA
t = 1 s	I_{FSM}	max.	1000		mA
Total power dissipation** up to T_{amb} = 25 °C	P_{tot}	max.	300		mW
Storage temperature	T_{stg}		−65 to +150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient**	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS, per diode

T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 10 mA	V_F	<	0,75	V
I_F = 200 mA	V_F	<	1,00	V
I_F = 200 mA; T_j = 100 °C	V_F	<	0,95	V
I_F = 500 mA	V_F	<	1,25	V
Reverse current				
V_R = 60 V	I_R	<	100	nA
V_R = 60 V; T_j = 150 °C	I_R	<	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2,5	pF

* Measured at zero life time at I_R = 10 μA; V_R = 75 V.

** Mounted on a ceramic substrate of 10 mm x 8 mm x 0,6 mm.

Forward recovery voltage when switched to

I_F = 400 mA; t_r1 = 30 ns	V_{fr}	<	120	V
I_F = 400 mA; t_r2 = 100 ns		<	1,5	V

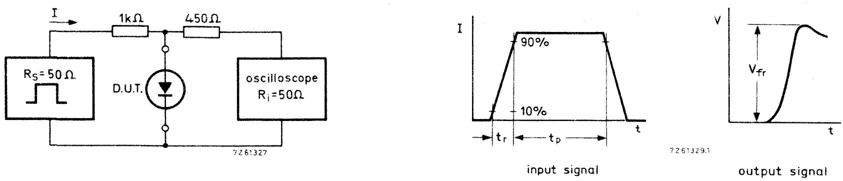


Fig. 2 Test circuit and waveforms; forward recovery voltage.

Input signal:	1st rise time of the forward pulse	t_r1	=	30	ns
	2nd rise time of the forward pulse	t_r2	=	100	ns
	Forward current pulse duration	t_p	=	300	ns
	Duty factor	δ	=	0,01	
Oscilloscope:	Rise time	t_r	=	0,35	ns
	Input capacitance	C_i	⩽	1	pF

Circuit capacitance C ⩽ 20 pF (C = C_i + parasitic capacitance)

Reverse recovery time when switched from I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω; measured at I_R = 40 mA	t_{rr}	<	6	ns

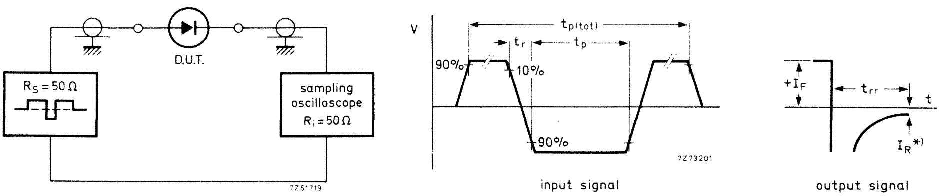
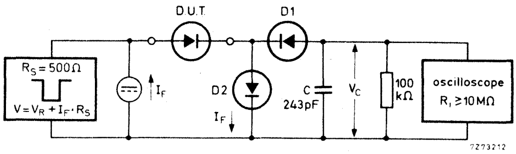


Fig. 3 Test circuits and waveforms; reverse recovery time.

Input signal:	Total pulse duration	$t_{p(tot)}$	=	0,2	µs
	Duty factor	δ	=	0,0025	
	Rise time of the reverse pulse	t_r	=	0,6	ns
	Reverse pulse duration	t_p	=	30	ns
Oscilloscope:	Rise time	t_r	=	0,35	ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	50	pC



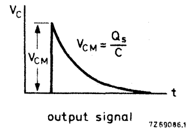


Fig. 4 Test circuit and waveform; recovery charge.

D1 = BAW62					
D2 = diode with minority carrier life time at 10 mA			<	200	ps
Input signal:	Rise time of the reverse pulse	t_r	=	2	ns
	Reverse pulse duration	t_p	=	400	ns
	Duty factor	δ	=	0,02	

Circuit capacitance C ≤ 7 pF (C = oscilloscope input capacitance + parasitic capacitance)

SCHOTTKY BARRIER DIODE

Silicon epitaxial diode in a microminiature plastic envelope. Intended for u.h.f. mixer and fast switching applications in thick and thin-film circuits.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	4	V
Forward current (d.c.)	I_F	max.	30	mA
Junction temperature	T_j	max.	100	°C
Forward voltage at I_F = 10 mA	V_F	<	600	mV
Diode capacitance at V_R = 0; f = 1 MHz	C_d	<	1,0	pF
Noise figure at f = 900 MHz	F	<	8,0	dB

MECHANICAL DATA

Dimensions in mm

Marking code

BAT17 = A3

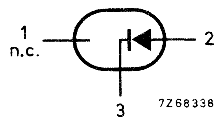
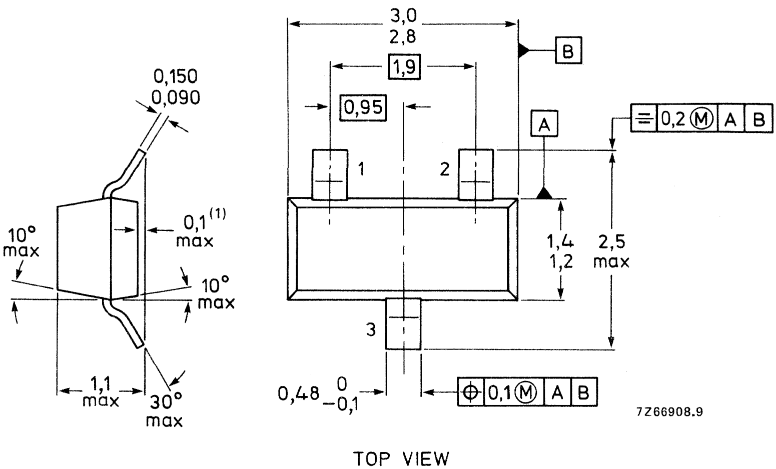


Fig.1 SOT-23.



(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations*.

RATINGS

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

Continuous reverse voltage	V_R	max.	4 V
Forward current (d.c.) **	I_F	max.	30 mA
Storage temperature	T_{stg}		−65 to +100 °C
Junction temperature	T_j	max.	100 °C

THERMAL CHARACTERISTICS*

$T_j = Px\ (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60 K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280 K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90 K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 3 V	I_R	<	0,25 μA
V_R = 3 V; T_{amb} = 60 °C	I_R	<	1,25 μA
Reverse breakdown voltage			
I_R = 10 μA	$V_{(BR)R}$	>	4 V
Forward voltage			
I_F = 0,1 mA	V_F	<	350 mV
I_F = 1,0 mA	V_F	<	450 mV
I_F = 10 mA	V_F	<	600 mV
Diode capacitance			
V_R = 0; f = 1 MHz	C_d	<	1,0 pF
Noise figure at f = 900 MHz ▲	F	<	8,0 dB
Series resistance at f = 1 kHz			
I_F = 5 mA	r_D	<	15 Ω

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

▲ The local oscillator is adjusted for a diode current of 2 mA. I.F. amplifier noise F_{if} = 1,5 dB; f = 35 MHz.

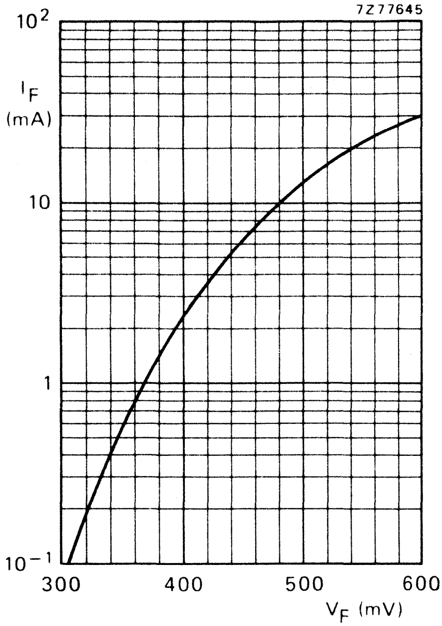


Fig. 2 Typical values.

SILICON PLANAR DIODE

Band switching diode in a microminiature plastic envelope. Intended for thick and thin-film circuits.

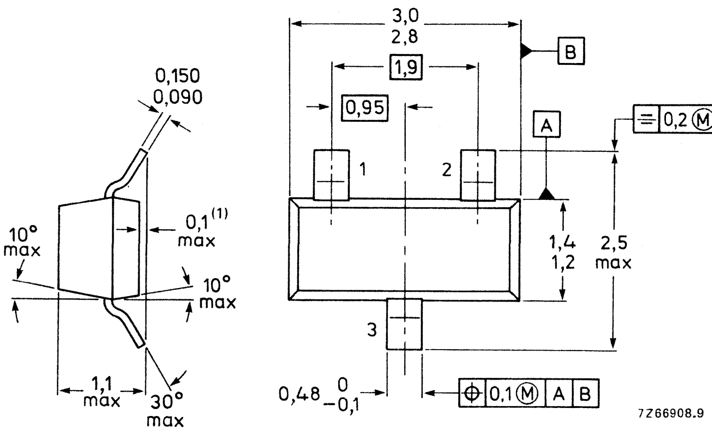
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	35	V
Forward current (d.c.)	I_F	max.	100	mA
Junction temperature	T_j	max.	100	°C
Diode capacitance at f = 1 MHz V_R = 20 V	C_d	typ. <	0,8 1,0	pF pF
Series resistance at f = 200 MHz I_F = 5 mA	r_D	typ. <	0,5 0,7	Ω Ω

MECHANICAL DATA

Dimensions in mm

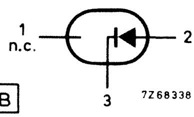
Fig. 1 SOT-23.



TOP VIEW

Marking code

BAT18 = A2



(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

Continuous reverse voltage	V_R	max.	35	V
Forward current (d.c.)	I_F	max.	100	mA
Storage temperature	T_{stg}	−55 to + 125		°C
Junction temperature	T_j	max.	125	°C

THERMAL CHARACTERISTICS*

$T_j = P \times (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280	K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Forward voltage at $I_F = 100$ mA	V_F	<	1,2	V
Reverse current				
$V_R = 20$ V	I_R	<	100	nA
$V_R = 20$ V; $T_j = 60\ ^oC$	I_R	<	1	μA
Diode capacitance at f = 1 MHz				
$V_R = 20$ V	C_d	typ.	0,8	pF
		<	1,0	pF
Series resistance at f = 200 MHz				
$I_F = 5$ mA	r_D	typ.	0,5	Ω
		<	0,7	Ω

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

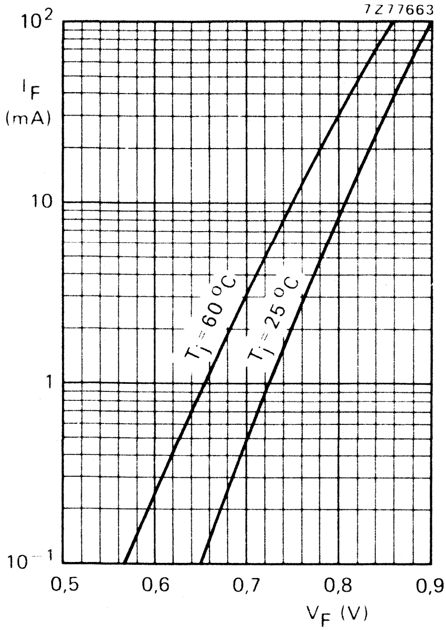


Fig. 2 Typical values.

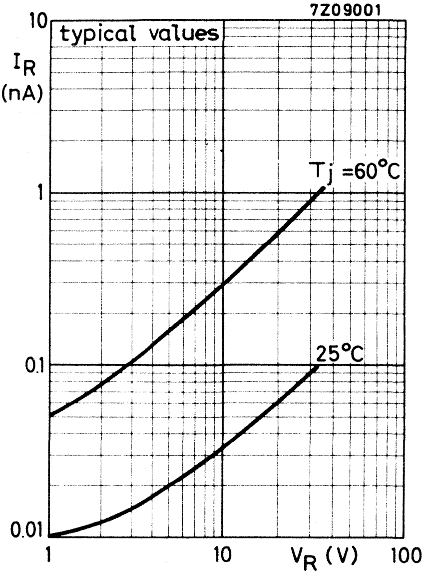


Fig. 3.

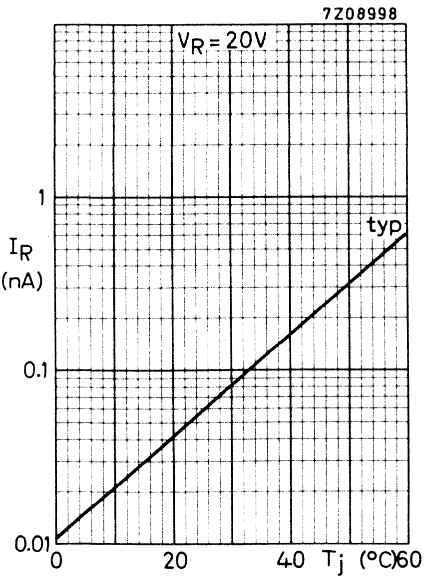


Fig. 4.

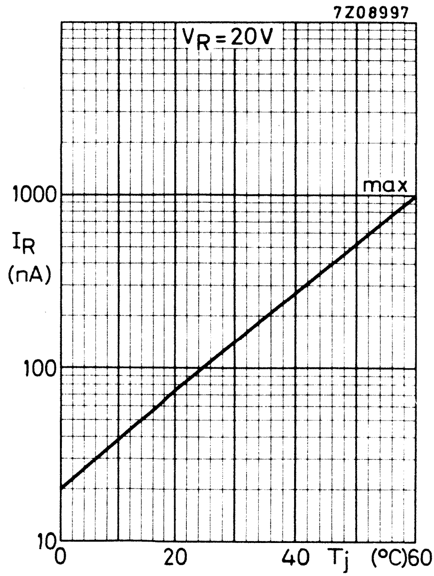


Fig. 5.

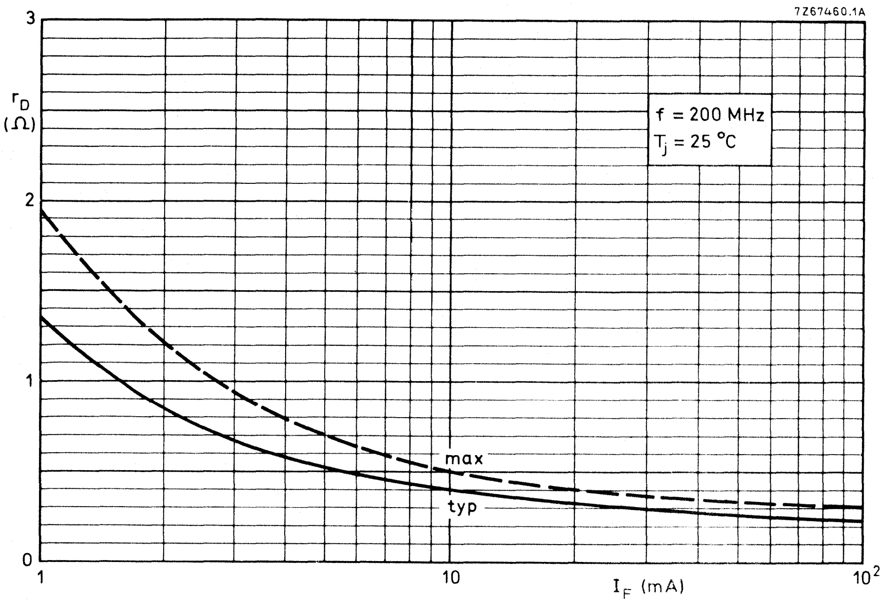


Fig. 6.

SCHOTTKY BARRIER DIODE

Silicon epitaxial Schottky barrier diode with an integrated p-n junction protection ring in a micro-miniature SOT-23 envelope intended for surface mounting.

The diode features especially a low forward voltage.

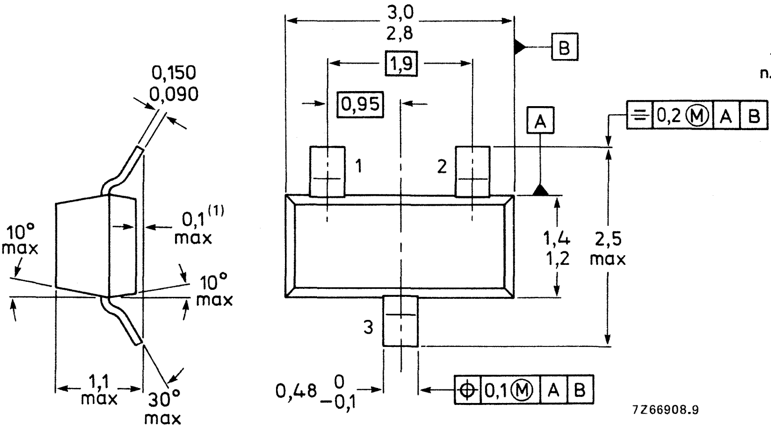
QUICK REFERENCE DATA

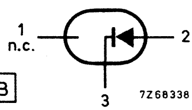
Continuous reverse voltage	V_R	max.	30	V
Forward current (d.c.)	I_F	max.	200	mA
Forward voltage at I_F = 10 mA	V_F	max.	400	mV
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	230	mW
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	≤	5	ns
Junction temperature	T_j	max.	125	°C

Fig. 1 SOT-23

Dimensions in mm

Marking code: L4





TOP VIEW

(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

Continuous reverse voltage	V_R	max.	30	V
Forward current (d.c.) see Fig. 2	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	300	mA
Non-repetitive peak forward current $t < 1$ s	I_{FSM}	max.	600	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	230	mW
Storage temperature	T_{stg}		−55 to +150	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate of 10 mm x 8 mm x 0,6 mm	$R_{th\ j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Forward voltage				
I_F = 0,1 mA	V_F	⩽	240	mV
I_F = 1 mA*	V_F	⩽	320	mV
I_F = 10 mA	V_F	⩽	400	mV
I_F = 30 mA*	V_F	⩽	500	mV
I_F = 100 mA	V_F	=	500	mV
	V_F	<	1000	mV
Reverse current V_R = 25 V	I_R	⩽	2	μA
Reverse breakdown voltage	$V_{(BR)R}$	>	30	V
Diode capacitance V_R = 1 V; f = 1 MHz	C_d	⩽	10	pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	⩽	5	ns

* Temperature coefficient of forward voltage:
−0,6 %/K at I_F = 1 mA
−0,3 %/K at I_F = 30 mA

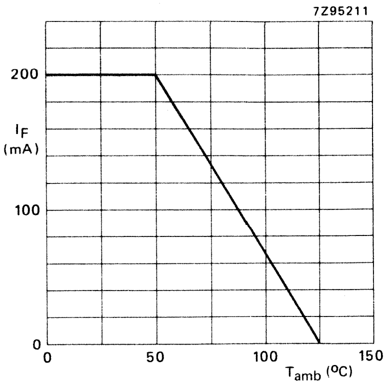


Fig. 2 Derating curve maximum ambient temperature.

SCHOTTKY BARRIER DIODE

Two separate silicon epitaxial Schottky barrier diodes with an integrated p-n junction protection ring in one microminiature SOT-143 envelope, intended for surface mounting (SMD technology).

The device features a low forward voltage drop.

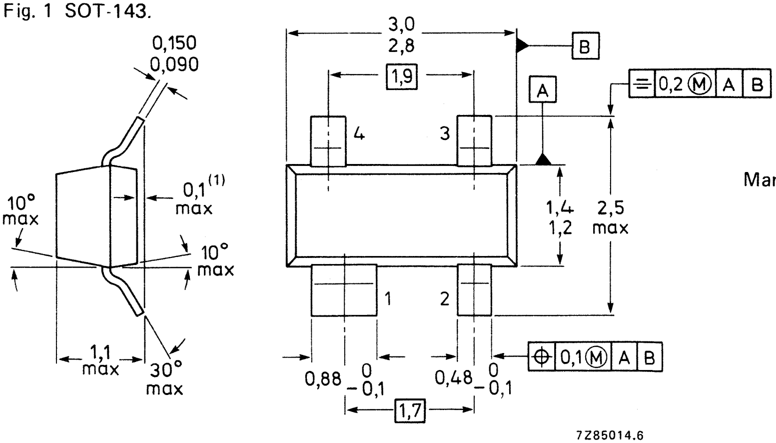
QUICK REFERENCE DATA

			single diode	double-diode operation	
Continuous reverse voltage	V_R	max.	30	30	V
Continuous reverse voltage series connection	V_R	max.	–	60	V
Forward current	I_F	max.	200	110	mA
Repetitive peak forward current	I_{FRM}	max.	300	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	600		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	230		mW
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	⩽	5		ns

MECHANICAL DATA

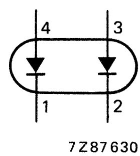
Dimensions in mm

Fig. 1 SOT-143.



TOP VIEW

Marking code : L41



(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

			single diode	double-diode operation	
Continuous reverse voltage	V_R	max.	30	30	V
Continuous reverse voltage series connection	V_R	max.	–	60	V
Forward current (see Fig. 2)	I_F	max.	200	110*	mA
Repetitive peak forward current	I_{FRM}	max.	300	200	mA
Non-repetitive peak forward current $t < 1$ s	I_{FSM}	max.	600		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	230		mW
Storage temperature	T_{stg}		−65 to + 150		°C
Junction temperature	T_j	max.	125		°C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate of 10 mm x 8 mm x 0,6 mm	$R_{th\ j\text{-}a}$	430	K/W

CHARACTERISTICS, per diode

T_{amb} = 25 °C unless otherwise specified

Forward voltage				
I_F = 0,1 mA	V_F	≤	240	mV
I_F = 1 mA**		≤	320	mV
I_F = 10 mA	V_F	≤	400	mV
I_F = 30 mA**		≤	500	mV
I_F = 100 mA	V_F	=	500	mV
		<	1000	mV
Reverse current V_R = 25 V	I_R	≤	2	μA
Reverse breakdown voltage	$V_{(BR)R}$	>	30	V
Diode capacitance V_R = 1 V; f = 1 MHz	C_d	≤	10	pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω, measured at I_R = 1 mA	t_{rr}	≤	5	ns

* If both diodes are in forward operation at the same moment, total device current max. 110 mA. If one diode is in reverse and the other in forward operation at the same moment, total device current max. 200 mA.

** Temperature coefficient of forward voltage: −0,6%/K at I_F = 1 mA.

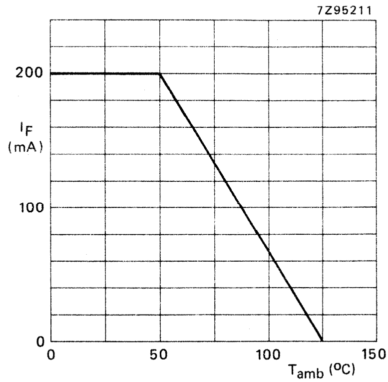


Fig. 2 Derating curve maximum ambient temperature.

SCHOTTKY BARRIER DIODES

General purpose and switching Schottky barrier diodes in a SOD-68 envelope, with an integrated protection ring against extremely high static discharges. They feature a low forward voltage drop, low leakage current and a low capacitance and as such can be used in very fast switching applications.

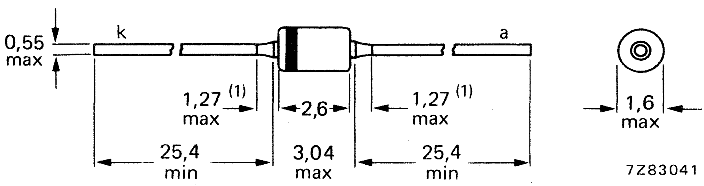
QUICK REFERENCE DATA

			BAT81	82	82	
Continuous reverse voltage	V_R	max.	40	50	60	V
Forward current (d.c.)	I_F	max.		30		mA
Junction temperature	T_j	max.		200		°C
Forward voltage I_F = 1 mA	V_F	<		410		mV
Reverse current at V_R = 30 V	I_R	<		200		nA
Diode capacitance	C_d	<		1,6		pF

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled band.

The cathode is indicated by a coloured band.

RATINGS

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

			BAT81	82	83	
Continuous reverse voltage	V_R	max.	40	50	60	V
Forward current						
d.c.	I_F	max		30		mA
peak value; $t_p < 1$ s	I_{FM}	max.		150		mA
Storage temperature	T_{stg}			−65 to +200		°C
Junction temperature (see Fig. 2)	T_j	max.		200		°C

THERMAL RESISTANCE

THERMAL RESISTANCE	$R_{th\ j\text{-}a}$	max.	320	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

			BAT81	82	83	
Reverse breakdown voltage						
$I_R = 10\ \mu A$	$V_{(BR)R}$	>	40	50	60	V
Forward voltage						
I_F = 0,1 mA	V_F	<		330		mV
I_F = 1 mA	V_F	<		410		mV
I_F = 15 mA	V_F	<		1		V
Temperature coefficent						
I_F = 1 mA	S_F	=		0,2		%/K
I_F = 10 mA	S_F	=		0,04		%/K
Reverse current						
V_R = 30 V	I_R	<		200		nA
Diode capacitance						
V_R = 1 V; f = 1 MHz	C_d	<		1,6		pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<		1		ns*

* Due to lack of minority carrier injection reverse recovery time only depends on junction capacitance and circuit resistance.

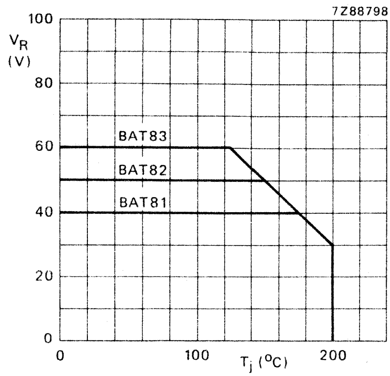


Fig. 2 Derating curve maximum junction temperature.

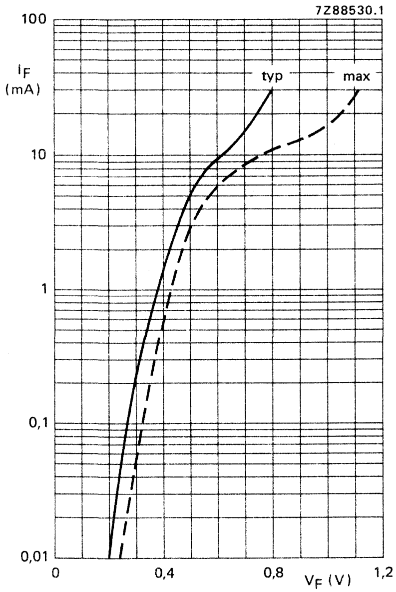


Fig. 3 Forward current versus forward voltage; typ.values.

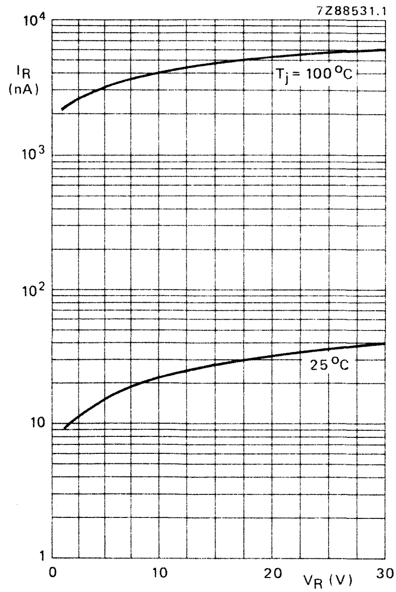


Fig. 4 Reverse current versus reverse voltage; typ. values.

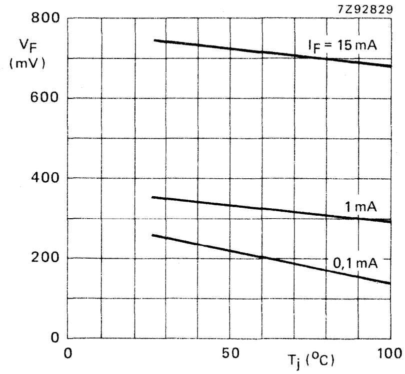


Fig. 5 Forward voltage versus junction temperature; typ. values.

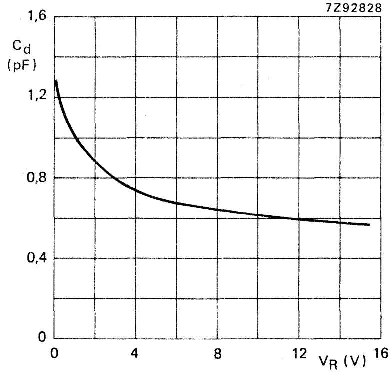


Fig. 6 Diode capacitance versus reverse voltage; f = 1 MHz; typical values.

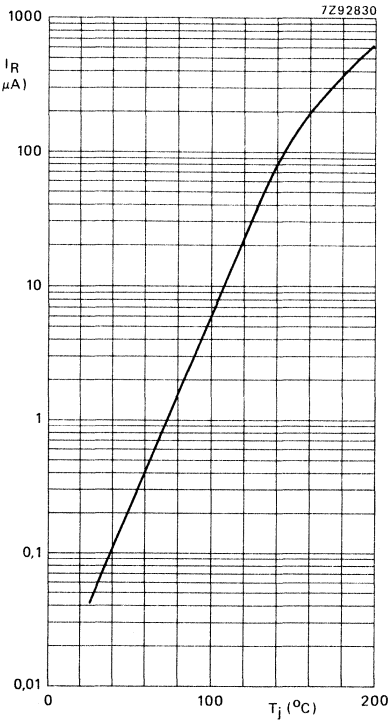


Fig. 7 Reverse current versus junction temperature; V_R = 30 V; typical values.

SCHOTTKY BARRIER DIODE

Schottky barrier diode with an integrated protection ring against extremely high static discharges.

This diode, in a DO-34 envelope, is intended for applications where a very low forward voltage is required.

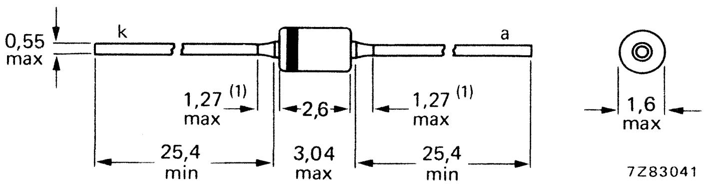
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Forward current (d.c.)	I_F	max.	200	mA
Peak forward current	I_{FM}	max.	300	mA
Junction temperature	T_j	max.	125	°C
Forward voltage $I_F = 10$ mA	V_F	<	400	mV
Diode capacitance	C_d	<	10	pF

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.
The cathode is indicated by a coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	30	V
Forward current				
d.c.	I_F	max.	200	mA
peak value	I_{FM}	max.	300	mA
peak value; $t_p < 1$ s		max.	600	mA
Average rectified forward current (see Fig. 2)	$I_{F(AV)}$	max.	200	mA
Storage temperature	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient when mounted on a printed circuit board at a lead length of 4 mm	$R_{th\ j\text{-}a}$	max.	320	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Forward voltage*				
I_F = 0,1 mA	V_F	<	240	mV
I_F = 1 mA		<	320	mV
I_F = 10 mA	V_F	<	400	mV
I_F = 30 mA		<	500	mV
I_F = 100 mA	V_F	typ.	500	mV
		max.	1000	mV
Reverse current V_R = 25 V	I_R	<	2	μA
Reverse breakdown voltage I_R = 10 μA	$V_{(BR)R}$	>	30	V
Diode capacitance V_R = 1 V; f = 1 MHz	C_d	<	10	pF
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	5	ns

* Temperature coefficient

I_F = 1 mA	S_F	typ.	−0,2	%/K
I_F = 15 mA		typ.	−0,04	%/K

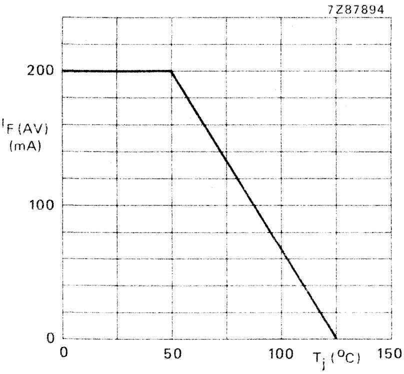


Fig. 2 Typical values.

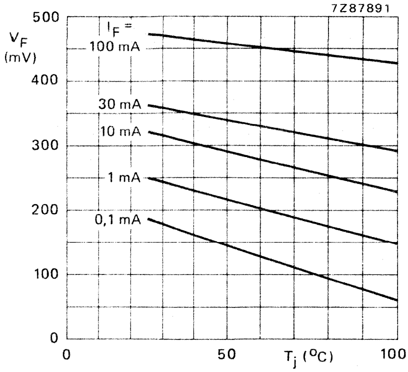


Fig. 3 Typical values.

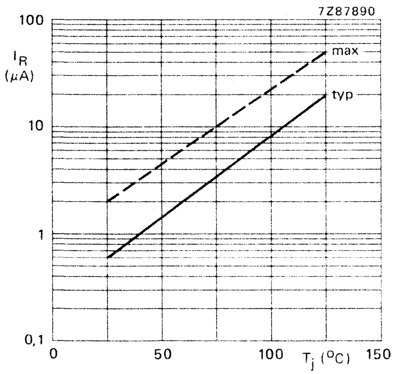


Fig. 4 V_R = 25 V; typ. values.

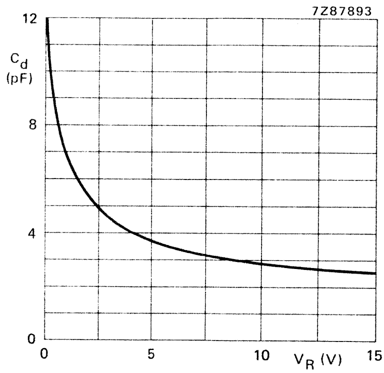


Fig. 5 f = 1 MHz; typ. values.

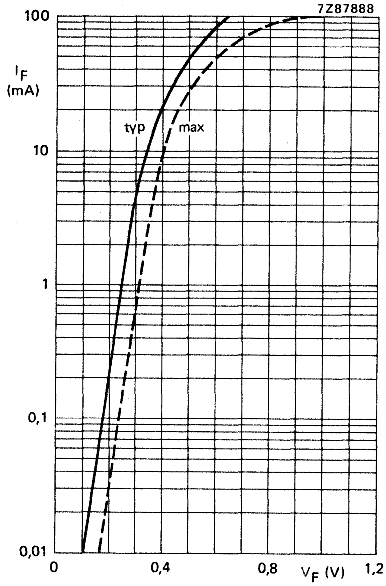


Fig. 6 ——— Typical values
– – – Maximum values.

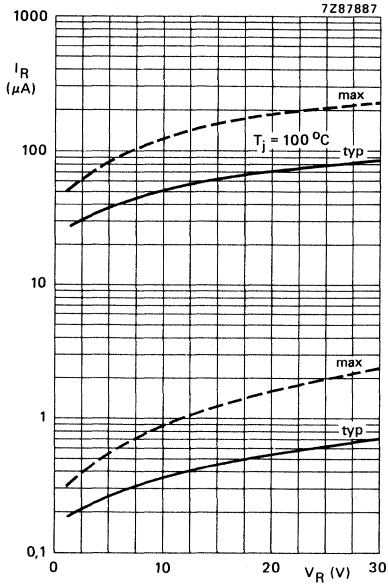


Fig. 7 ——— Typical values
– – – Maximum values.

SCHOTTKY BARRIER DIODE

Schottky barrier diode with an integrated protection ring against extremely high static discharges. The small DO-34 envelope can actually be mounted on a 2E pitch.

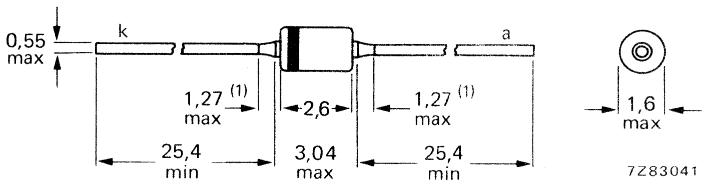
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	50	V
Forward current (d.c.)	I_F	max.	200	mA
Peak forward current	I_{FM}	max.	250	mA
Junction temperature	T_j	max.	125	°C
Forward voltage I_F = 10 mA	V_F	<	400	mV
Diode capacitance	C_d	<	8	pF

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.
The cathode is indicated by a coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	50	V
Forward current				
d.c.	I_F	max.	200	mA
peak value	I_{FM}	max.	250	mA
peak value; $t_p < 1$ s	I_{FM}	max.	500	mA
Average rectified forward current (see Fig. 2)	$I_{F(AV)}$	max.	200	mA
Storage temperature	T_{stg}		−65 to +150	°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient when mounted on a printed circuit board at a lead length of 4 mm	$R_{th\ j\text{-}a}$	max.	320	K/W

CHARACTERISTICS

$T_{amb} = 25$ °C unless otherwise specified

Forward voltage*				
$I_F = 0,1$ mA	V_F	<	300	mV
$I_F = 1$ mA	V_F	<	380	mV
$I_F = 10$ mA	V_F	<	450	mV
$I_F = 30$ mA	V_F	<	600	mV
$I_F = 100$ mA	V_F	typ.	600	mV
		max.	1,1	V
Reverse current $V_R = 25$ V	I_R	<	2	μA
Reverse breakdown voltage $I_R = 10$ μA	$V_{(BR)R}$	>	50	V
Diode capacitance $V_R = 1$ V; f = 1 MHz	C_d	<	8	pF
Reverse recovery time when switched from $I_F = 10$ mA to $I_R = 10$ mA; $R_L = 100\ \Omega$; measured at $I_R = 1$ mA	t_{rr}	<	4	ns

* Temperature coefficient

$I_F = 1$ mA	S_F	typ.	−0,2	%/K
$I_F = 15$ mA	S_F	typ.	−0,04	%/K

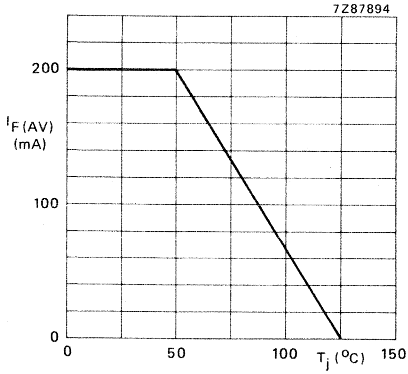


Fig. 2 Typical values.

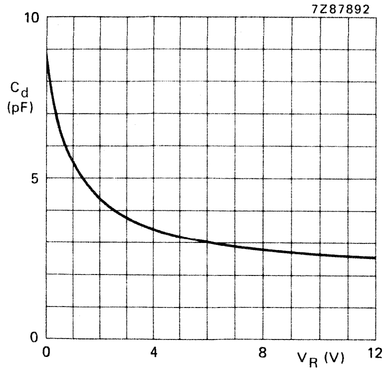


Fig. 3 f = 1 MHz; typ. values.

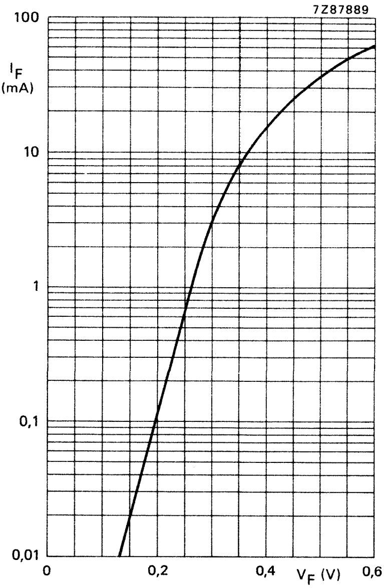


Fig. 4 Typical values.

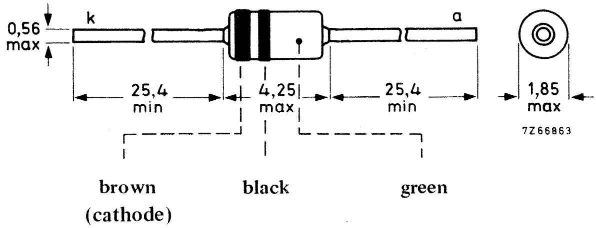
ULTRA-HIGH-SPEED DIODE

Silicon planar epitaxial, ultra-high-speed, high-conductance diode in a DO-35 envelope.
The BAV10 is primarily intended for core gating in very fast memories.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V
Repetitive peak forward current	I_{FRM}	max.	600	mA
Junction temperature	T_j	max.	200	^oC
Forward voltage at I_F = 200 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω; measured at I_R = 40 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	50	pC

MECHANICAL DATA Dimensions in mm

Fig. 1 DO-35.



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

Voltages

Continuous reverse voltage	V_R	max.	60	V	
Repetitive peak reverse voltage	V_{RRM}	max.	60	V	1)

Currents

Average rectified forward current	$I_{F(AV)}$	max.	300	mA	2)
Forward current (d.c.)	I_F	max.	300	mA	
Repetitive peak forward current	I_{FRM}	max.	600	mA	
Non-repetitive peak forward current t = 1 μs	I_{FSM}	max.	4000	mA	
t = 1 s	I_{FSM}	max.	1000	mA	

Temperatures

Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0,5	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA	V_F	<	0,75	V
I_F = 200 mA	V_F	<	1,00	V
I_F = 200 mA; T_j = 100 °C	V_F	<	0,95	V
I_F = 500 mA	V_F	<	1,25	V

Reverse current

V_R = 60 V	I_R	<	100	nA
V_R = 60 V; T_j = 150 °C	I_R	<	100	μA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	2,5	pF

1) Measured at zero life time at I_R = 10 μA; V_R = 75 V.

2) For pulse operation see Figs 6 and 7. For sinusoidal operation see Figs 8 to 11.

CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Forward recovery voltage when switched to

I_F = 400 mA; t_{r1} = 30 ns	V_{fr}	<	2,0	V
I_F = 400 mA; t_{r2} = 100 ns	V_{fr}	<	1,5	V

Test circuit and waveforms:

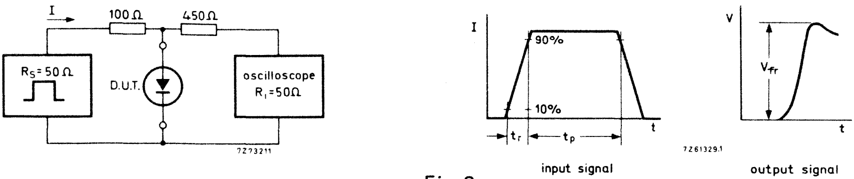


Fig. 2.

Input signal :	1st rise time of the forward pulse	t_{r1}	=	30 ns
	2nd rise time of the forward pulse	t_{r2}	=	100 ns
	Forward current pulse duration	t_p	=	300 ns
	Duty factor	δ	=	0, 01
Oscilloscope:	Rise time	t_r	=	0, 35 ns
	Input capacitance	C_i	≤	1 pF

Circuit capacitance C ≤ 20 pF (C = C_i + parasitic capacitance)

Reverse recovery time when switched from

I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω;
measured at I_R = 40 mA t_{rr} < 6 ns

Test circuit and waveforms:

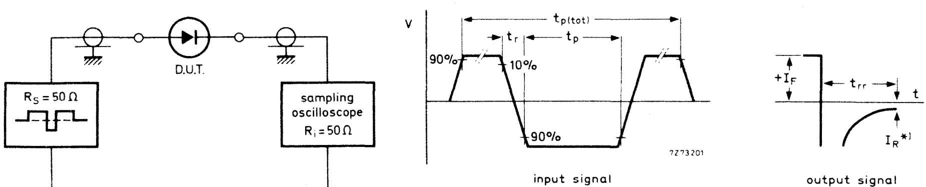


Fig. 3.

Input signal :	Total pulse duration	$t_{p(tot)}$	=	0, 2 μs	*) I_R = 40 mA
	Duty factor	δ	=	0, 0025	
	Rise time of the reverse pulse	t_r	=	0, 6 ns	
	Reverse pulse duration	t_p	=	30 ns	
Oscilloscope:	Rise time	t_r	=	0, 35 ns	

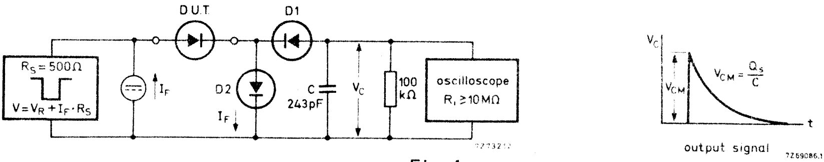
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Recovery charge when switched from

$I_F = 10$ mA to $V_R = 5$ V; $R_L = 500\ \Omega$ | Q_s | < | 50 | pC

Test circuit and waveform:



D1 = BAW62

Fig. 4.

D2 = diode with minority carrier life time at 10 mA: < 200 ps

Input signal	: Rise time of the reverse pulse	t_r	=	2 ns
	Reverse pulse duration	t_p	=	400 ns
	Duty factor	δ	=	0,02

Circuit capacitance C ≤ 7 pF (C = oscilloscope input capacitance + parasitic capacitance)

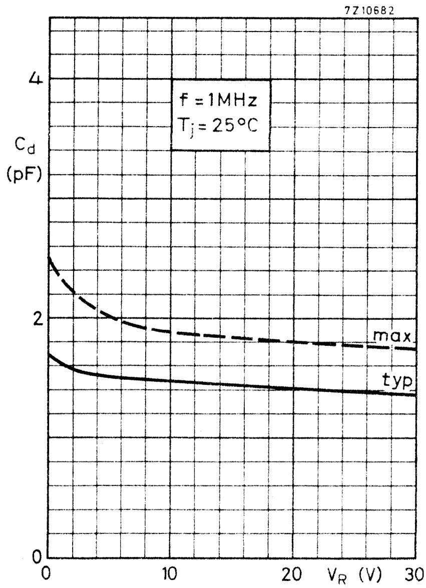


Fig. 5.

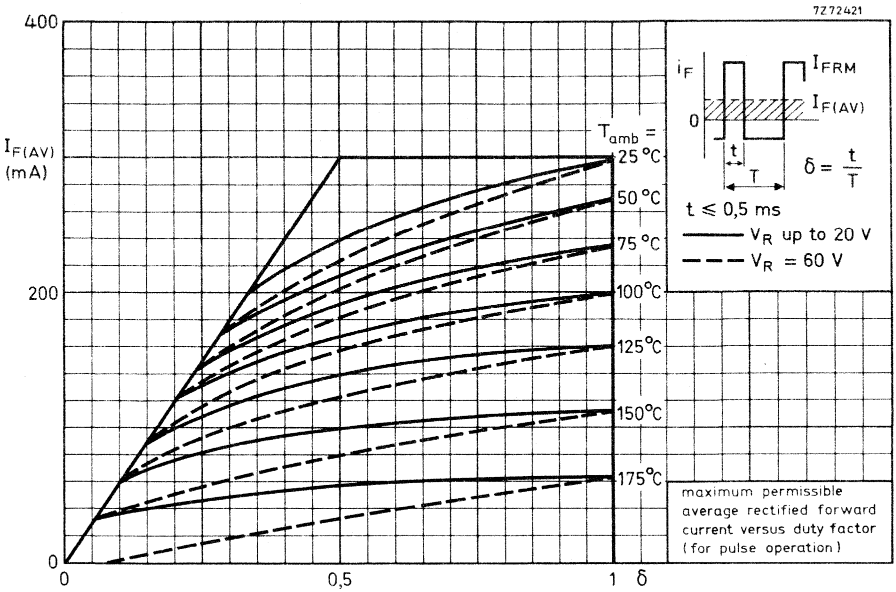

7Z72421
400
200
0
$I_{F(AV)}$
(mA)
0
0,5
1 δ
T_{amb} =
25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 6.

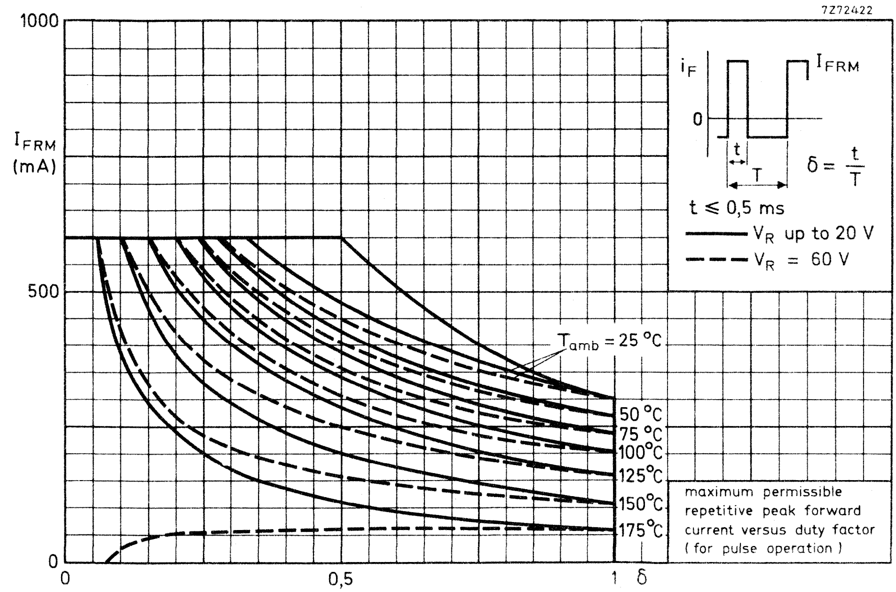

7Z72422
1000
500
0
I_{FRM}
(mA)
0
0,5
1 δ
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 7.

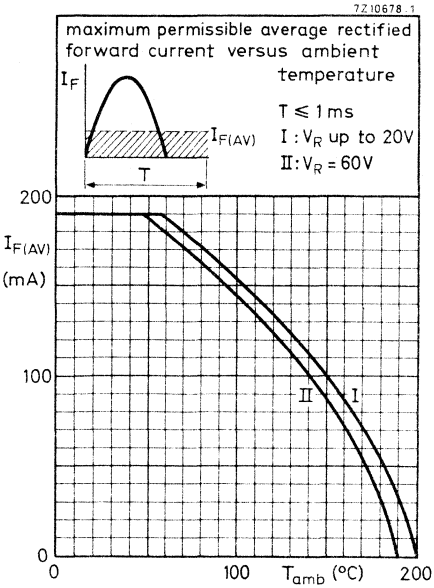


Fig. 8.

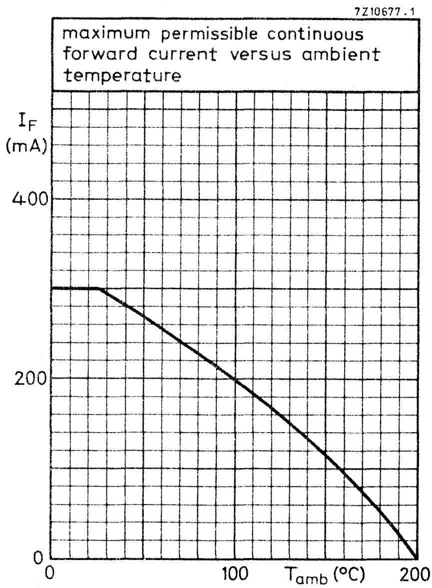


Fig. 9.

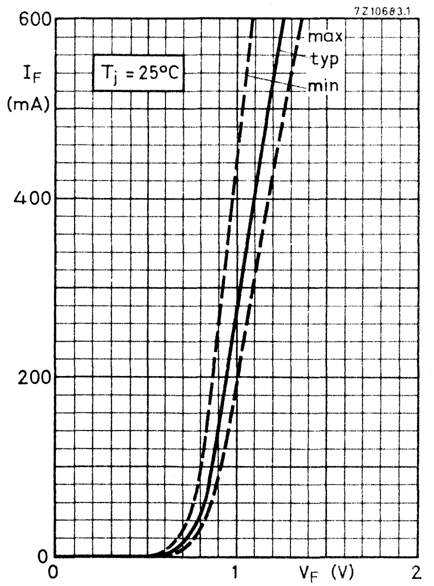


Fig. 10.

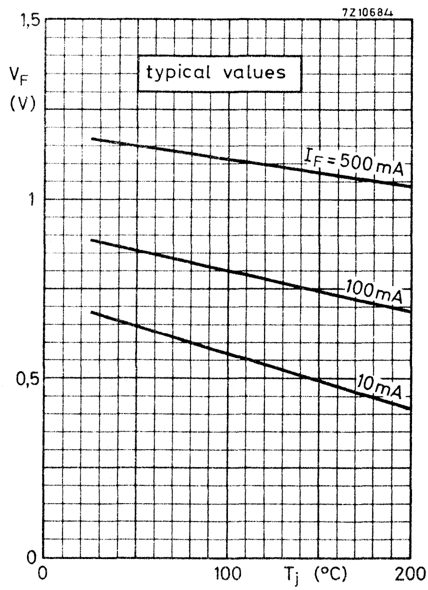


Fig. 11.

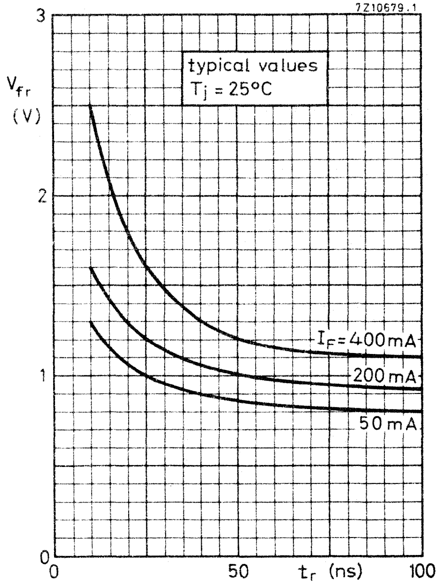


Fig. 12.

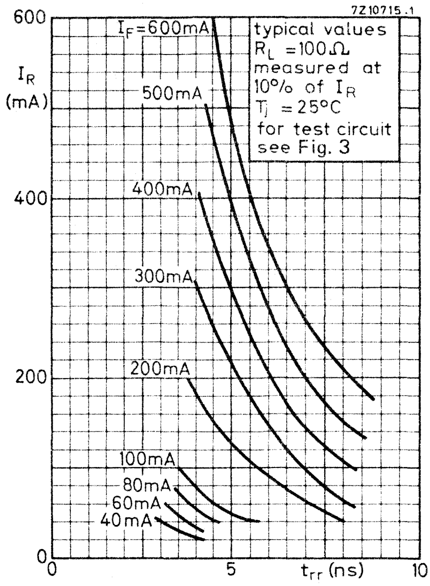


Fig. 13.

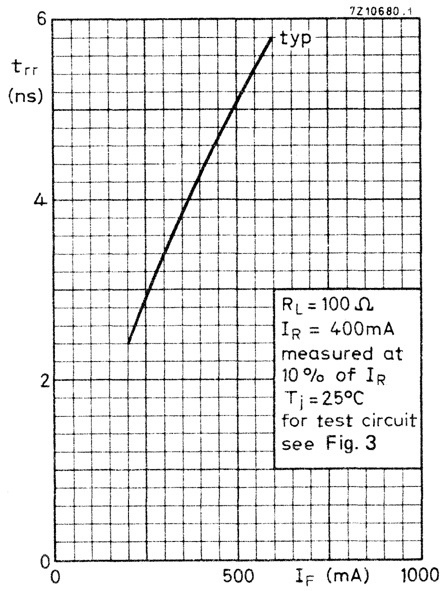


Fig. 14.

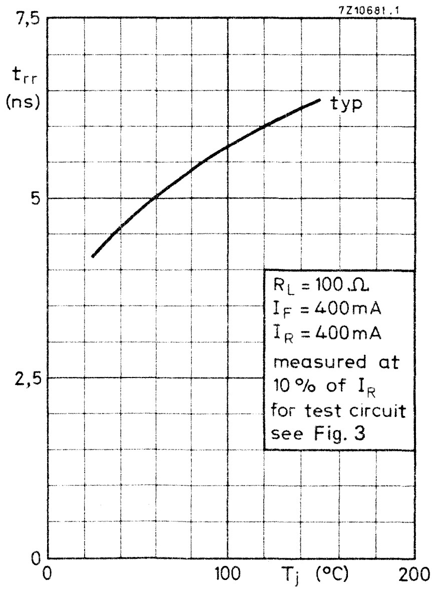
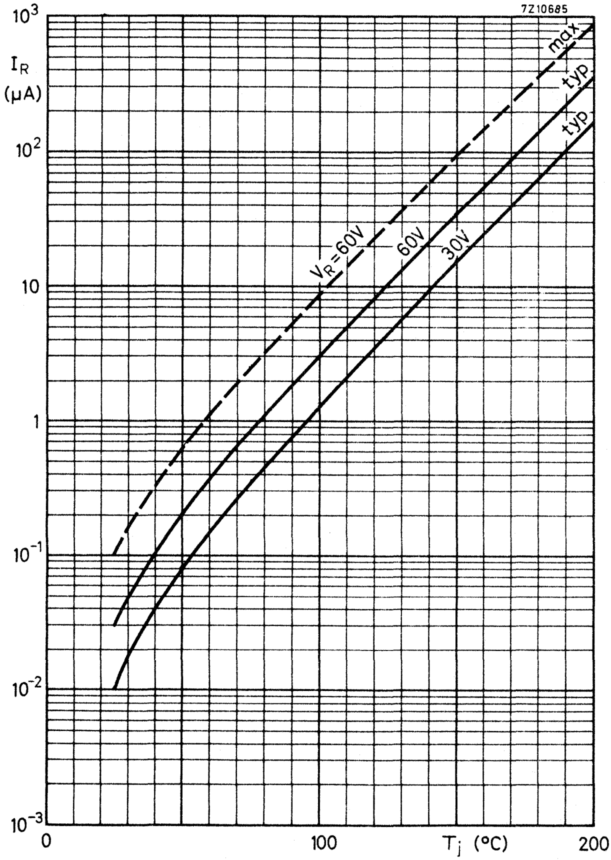


Fig. 15.


7Z10685
I_R
(μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
T_j (°C)
200
max
typ
typ
V_R=60V
60V
30V

GENERAL PURPOSE DIODES

Silicon planar epitaxial diodes in DO-35 envelopes; intended for switching and general purposes in industrial equipment e.g. oscilloscopes, digital voltmeters and video output stages in colour television.

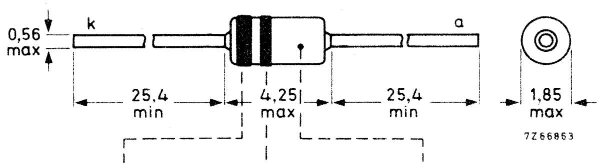
QUICK REFERENCE DATA

			BAV18	BAV19	BAV20	BAV21	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Forward current (d.c.)	I_F	max.	250				mA
Junction temperature	T_j	max.	175				°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,375				K/mW
Forward voltage at $I_F = 100$ mA	V_F	<	1,0				V
Reverse current at $V_R = V_{Rmax}$	I_R	<	100				nA
Diode capacitance at $V_R = 0$; f = 1 MHz	C_d	typ.	1,5				pF
		<	5,0				pF
Reverse recovery time when switched from $I_F = 30$ mA to $I_R = 30$ mA; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA	t_{rr}	<	50				ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



BAV18:	**brown**	**grey**	**green**
BAV19:	**brown**	**white**	**green**
BAV20:	**red**	**black**	**green**
BAV21:	**red**	**brown**	**green**
	(cathode)		

Diodes may be either type-branded or colour coded.

Products approved to CECC 50 001-022, available on request.

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

Voltages

			BAV18	BAV19	BAV20	BAV21	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	120	200	250	V

Currents

Average rectified forward current	$I_{F(AV)}$	max.	250	mA	1)
Forward current (d.c.)	I_F	max.	250	mA	
Repetitive peak forward current	I_{FRM}	max.	625	mA	
Non-repetitive peak forward current					
$t < 1$ s ; $T_j = 25$ °C	I_{FSM}	max.	1	A	
$t = 1$ µs; $T_j = 25$ °C	I_{FSM}	max.	5	A	

Power dissipation

Total power dissipation up to $T_{amb} = 25$ °C	P_{tot}	max.	400	mW

Temperatures

Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j-a}$	=	0,375	°C/mW

1) For pulse operation see Figs 3 to 6. For sinusoidal operation see Figs 7 to 10.

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 100 mA	V_F	<			1,0		V
I_F = 200 mA	V_F	<			1,25		V

Reverse breakdown voltage

			BAV18	BAV19	BAV20	BAV21	
I_R = 100 µA	$V_{(BR)R}$	>	60	120	200	250	V [1]

Reverse current

$V_R = V_{Rmax}$	I_R	<	100	nA
$V_R = V_{Rmax}$; T_j = 150 °C	I_R	<	100	µA

Differential resistance

I_F = 10 mA	r_{diff}	typ.	5	Ω

Diode capacitance

V_R = 0; f = 1 MHz	Cd	typ.	1,5	pF
		<	5,0	pF

Reverse recovery time when switched from

I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50	ns

Test circuit and waveforms:

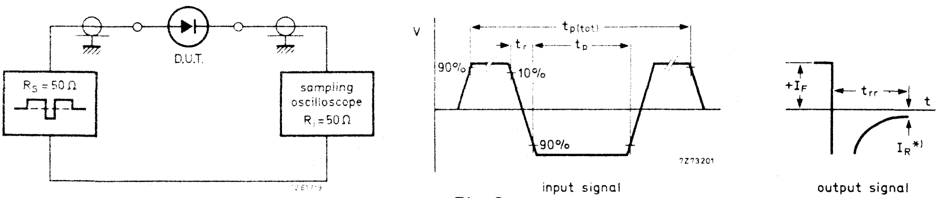


Fig. 2.

Input signal :	Total pulse duration	$t_{p(tot)}$	= 2 µs	*) I_R = 3 mA
	Duty factor	δ	= 0,0025	
	Rise time of the reverse pulse	t_r	= 0,6 ns	
	Reverse pulse duration	t_p	= 100 ns	
Oscilloscope:	Rise time	t_r	= 0,35 ns	

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

[1]) At zero life time, measured under pulse conditions to avoid excessive dissipation and voltage limited at 275 V.

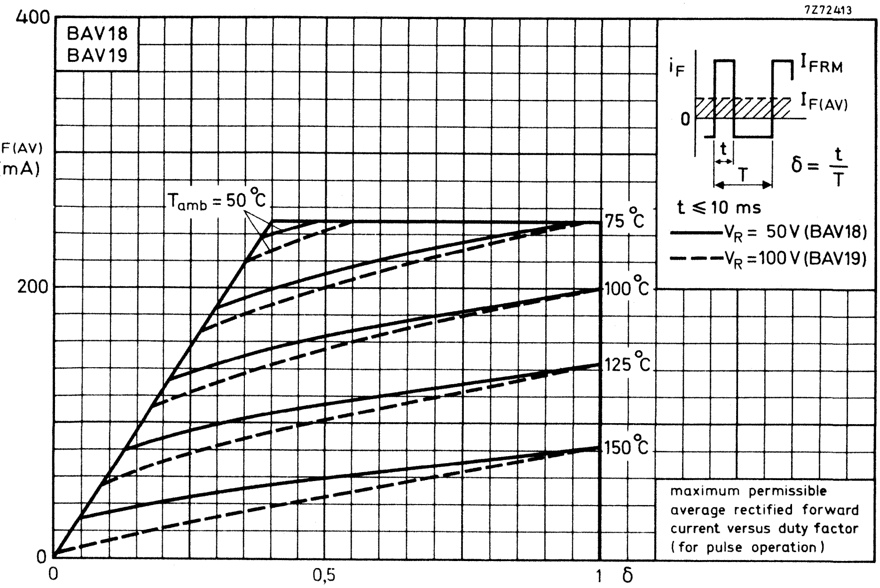

7Z72413
400
200
0
$I_{F(AV)}$
(mA)
BAV18
BAV19
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V (BAV18)
V_R = 100 V (BAV19)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 3.

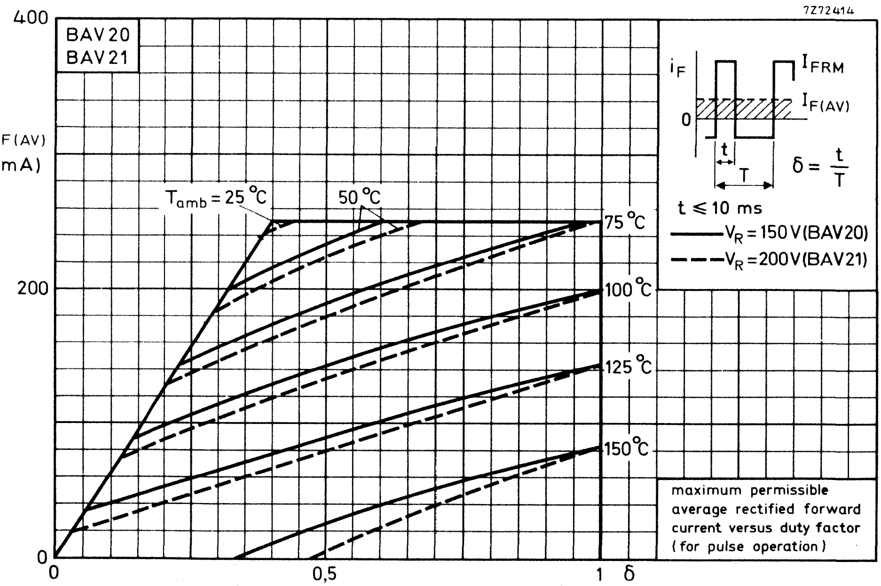

7Z72414
400
200
0
$I_{F(AV)}$
(mA)
BAV20
BAV21
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 150 V (BAV20)
V_R = 200 V (BAV21)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 4.

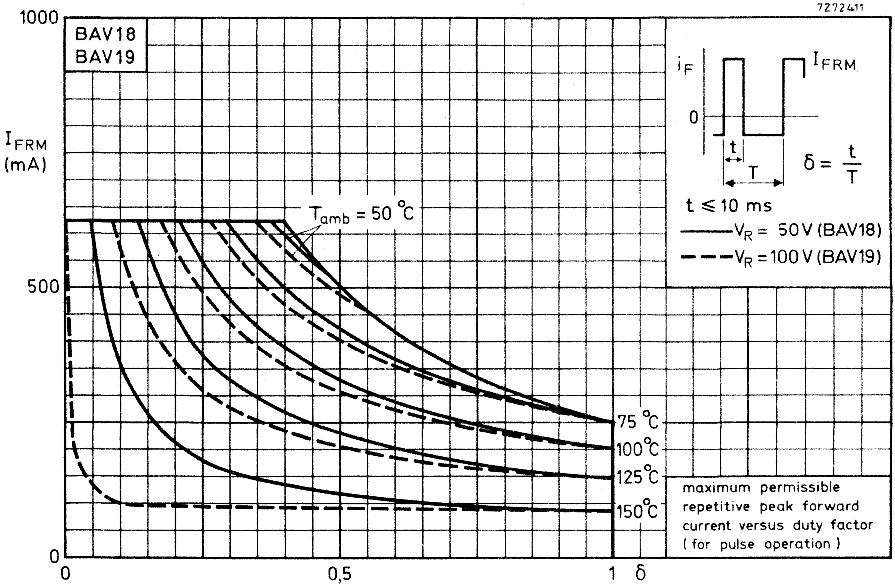

7Z72411
1000
500
0
IFRM (mA)
BAV18
BAV19
Tamb = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
iF
IFRM
0
t
T
δ = t/T
t ≤ 10 ms
VR = 50 V (BAV18)
VR = 100 V (BAV19)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 5.

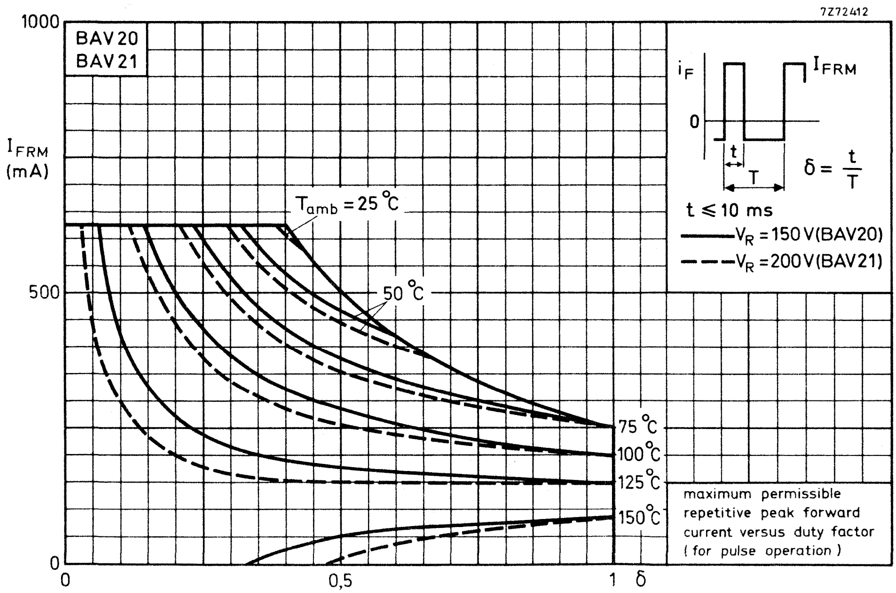

7Z72412
1000
500
0
IFRM (mA)
BAV20
BAV21
Tamb = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
iF
IFRM
0
t
T
δ = t/T
t ≤ 10 ms
VR = 150 V (BAV20)
VR = 200 V (BAV21)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 6.

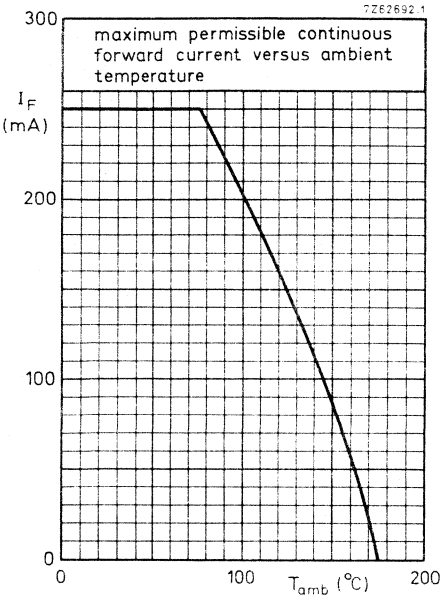


Fig. 7.

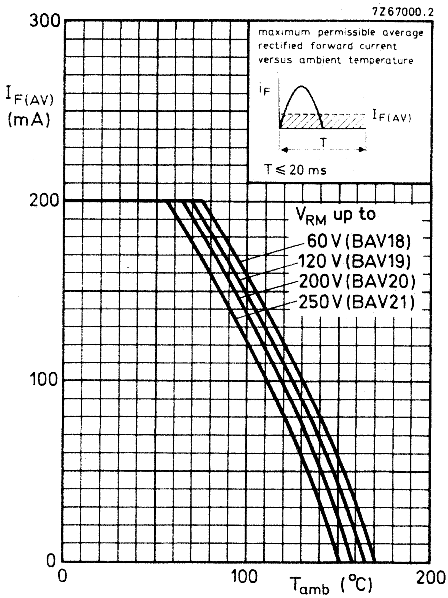


Fig. 8.

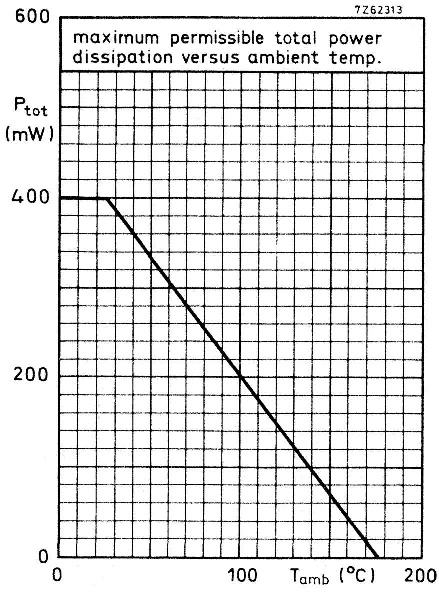


Fig. 9.

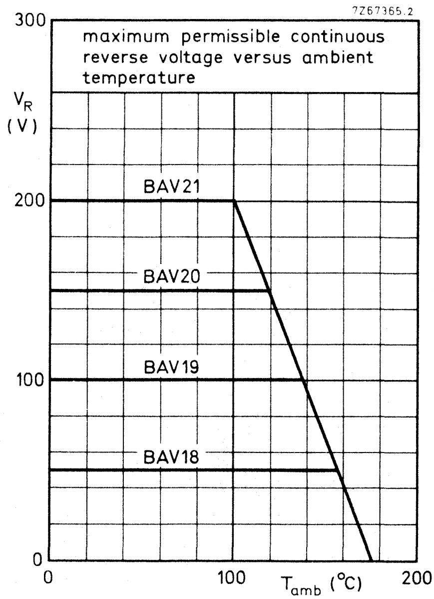


Fig. 10.

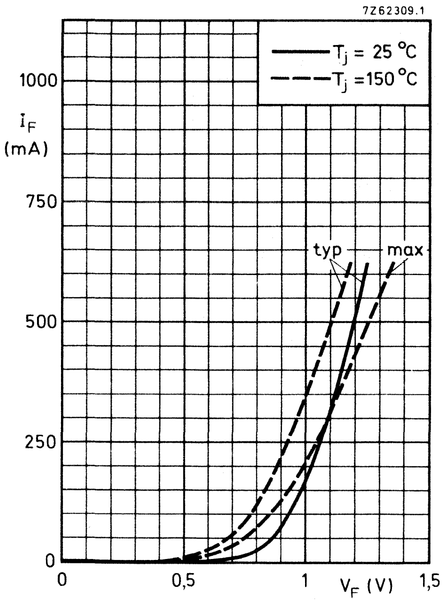


Fig. 11.

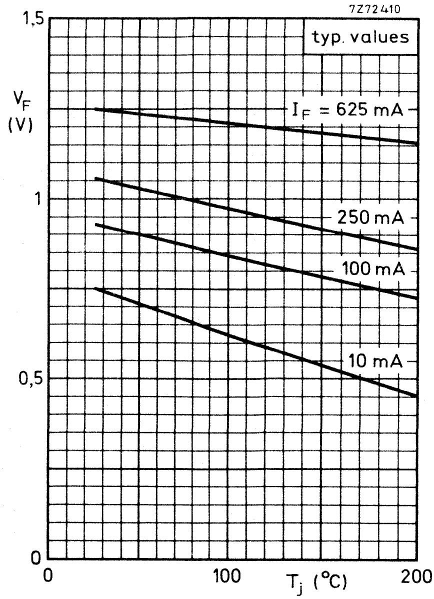


Fig. 12.

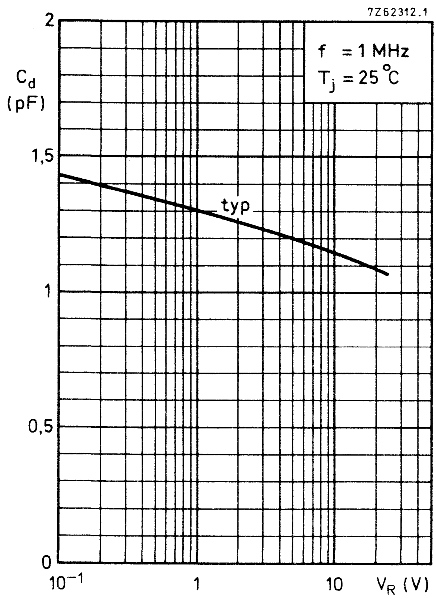


Fig. 13.

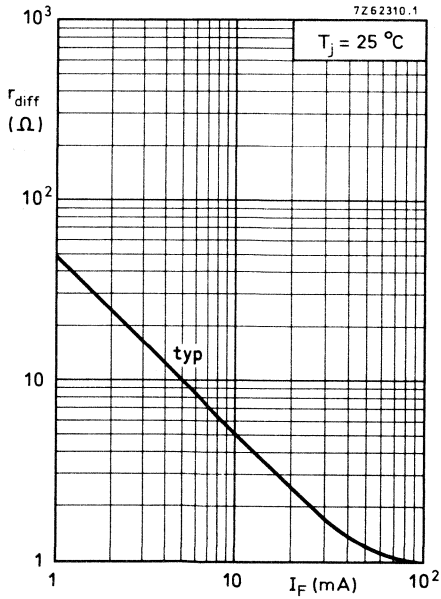


Fig. 14.

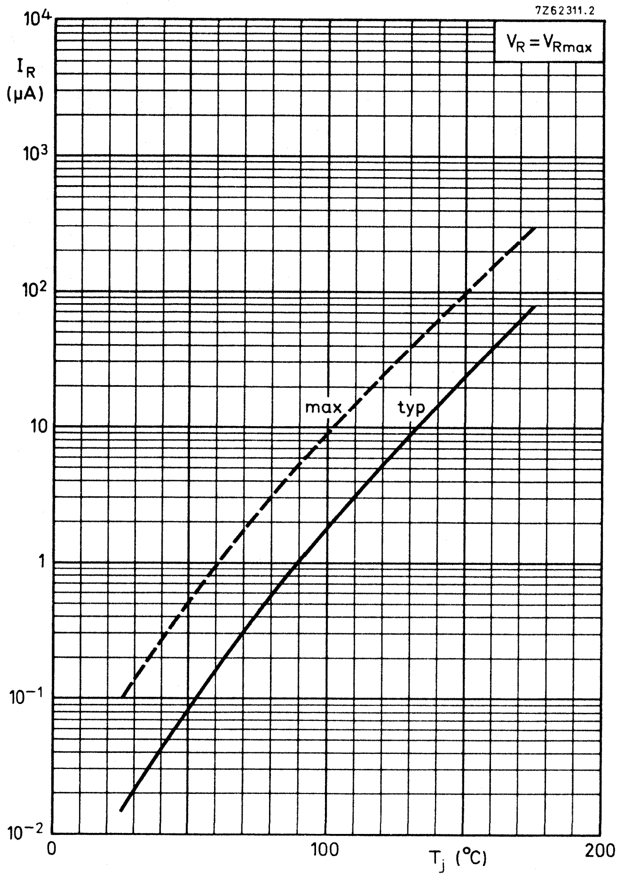

7Z62311.2
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

Fig. 15.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODE

The BAV23 consists of two separate planar epitaxial high-speed diodes in one microminiature plastic envelope intended for surface mounting.

The device is designed for switching and general applications where high breakdown voltages are required.

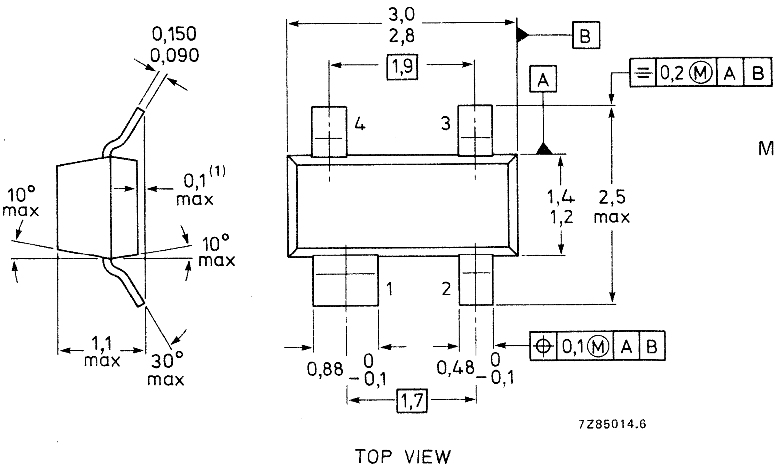
QUICK REFERENCE DATA

			single diode	series connection	
Continuous reverse voltage	V_R	max.	200	400	V
Repetitive peak reverse voltage	V_{RRM}	max.	250	500	V
Average forward current	$I_{F(AV)}$	max.	200	120	mA
Repetitive peak forward current	I_{FRM}	max.	625	450	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300		mW
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50		ns

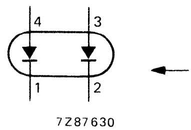
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-143.



Marking code: L30



(1) Also available in 0,1 – 0,2 mm version.

RATINGS

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

			single diode	series connection	
Continuous reverse voltage	V_R	max.	200	400	V
Repetitive peak reverse voltage	V_{RRM}	max.	250	500	V
Average forward current	$I_{F(AV)}$	max.	200	120	mA
Repetitive peak forward current	I_{FRM}	max.	625	450	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300		mW
Storage temperature	T_{stg}		−65 to +150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient on a ceramic substrate of 7 mm x 5 mm x 0,5 mm	$R_{th\ j\text{-}a}$	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			single diode	series connection	
Forward voltage I_F = 100 mA	V_F	<	1000	2000	mV
I_F = 200 mA	V_F	<	1250	2500	mV
Reverse current $V_R = V_{Rmax}$	I_R	<	100	100	nA
Reverse breakdown voltage 1 I_R = 100 μA	$V_{(BR)R}$	>	250	500	V
Differential forward resistance I_F = 10 mA	r_f	typ.	5	10	Ω
Diode capacitance V_R = 0; f = 1 MHz	C_d	<	5	2,5	pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50	50	ns

PICOAMPERE DIODE

Silicon diode in a metal envelope. It has an extremely low leakage current over a wide temperature range combined with a low capacitance and is not sensitive to light. It is intended for clamping, holding, peak follower, time delay circuits as well as for logarithmic amplifiers and protection of insulated gate field-effect transistors.

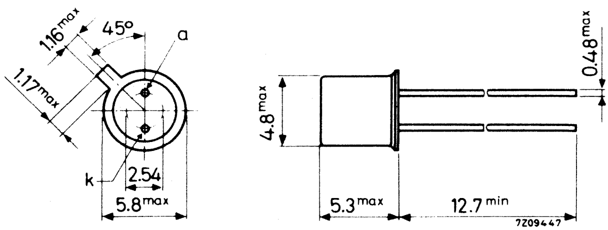
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	50 mA
Forward voltage at I_F = 10 mA	V_F	<	1,0 V
Reverse current			
V_R = 5 V; T_j = 25 °C	I_R	<	5 pA
V_R = 20 V; T_j = 25 °C	I_R	<	10 pA
Diode capacitance			
V_R = 0; f = 1 MGz	C_d	<	1,3 pF

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-18 (except for the two leads).



Handle the device with care whilst soldering into the circuit. The extremely low leakage current can only be guaranteed when the bottom is free from solder flux or other contaminations.

RATINGS

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

Continuous reverse voltage	V_R	max.	20	V
Repetitive peak reverse voltage	V_{RRM}	max.	35	V
Forward current (d.c. or average)	I_F	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	100	mA
Storage temperature	T_{stg}	−65 to + 125		°C
Junction temperature	T_j	max.	125	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	500	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 10 mA	V_F	<	1,0	V
Reverse current				
V_R = 5 V	I_R	<	5	pA
V_R = 5 V; T_j = 80 °C	I_R	<	250	pA
V_R = 20 V	I_R	<	10	pA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	1,3	pF
Forward recovery voltage when switched to				
I_F = 10 mA	V_{fr}	<	1,25	V

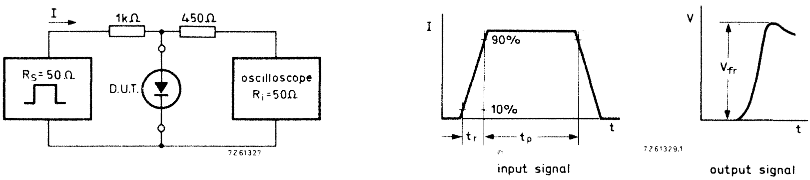


Fig. 2 Test circuit and waveforms.

Input signal				
Rise time of the forward pulse	t_r	⩽	20	ns
Forward current pulse duration	t_p	=	300	ns
Duty factor	δ	=	0,01	
Oscilloscope				
Rise time	t_r	=	0,35	ns
Input capacitance	C_i	⩽	1	pF

Circuit capacitance C ⩽ 20 pF (C = C_i + parasitic capacitance)

CHARACTERISTICS (continued)

Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	600	ns

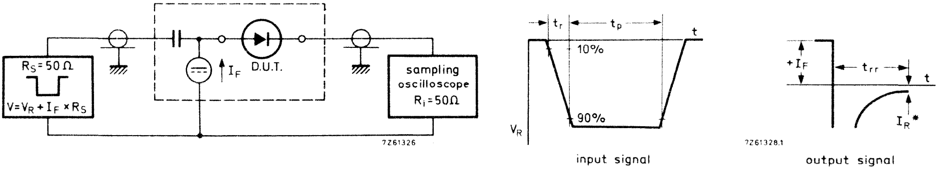


Fig. 3 Test circuit and waveforms.

* I_R = 1 mA.

Input signal				
Rise time of the reverse pulse	t_r	=	0,6	ns
Reverse pulse duration	t_p	=	500	ns
Duty factor	δ	=	0,05	
Oscilloscope				
Rise time	t_r	=	0,35	ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

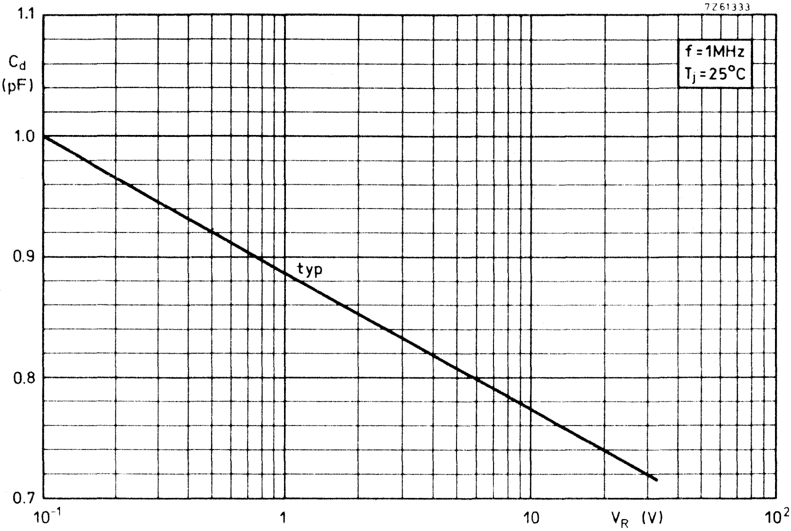

7Z61333
f = 1MHz
T_j = 25°C
C_d
(pF)
1.1
1.0
0.9
0.8
0.7
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 4.

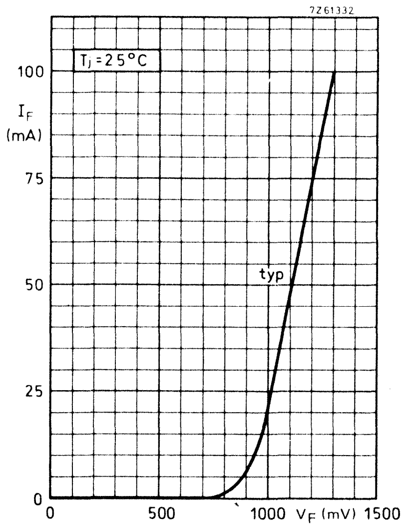

7Z61332
T_j = 25°C
I_F
(mA)
100
75
50
25
0
typ
0
500
1000
V_F (mV)
1500

Fig. 5.

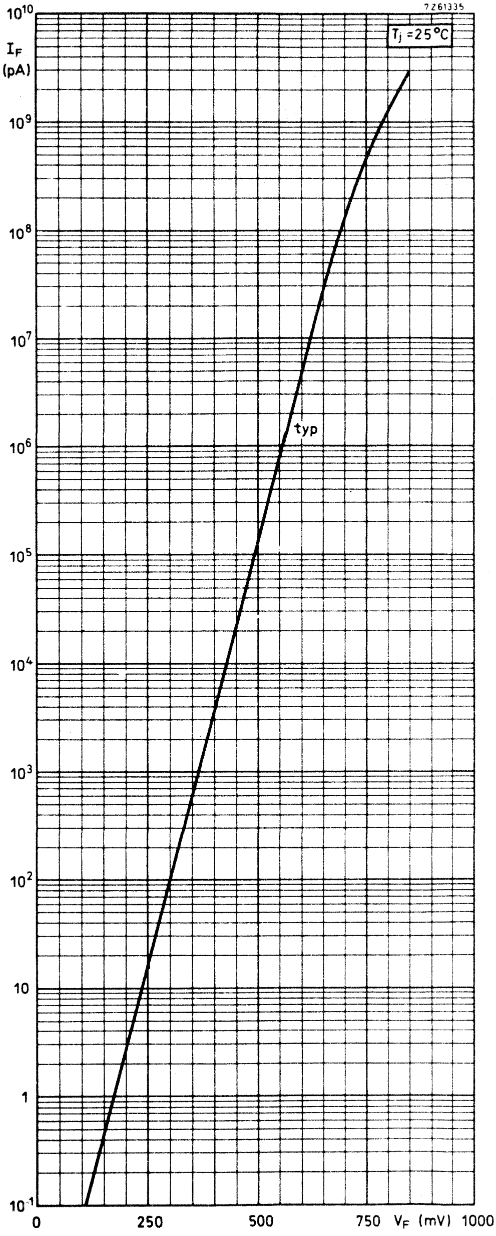

7Z61335
10^{10}
I_F
(pA)
$T_j = 25\,^{\circ}C$
10^9
10^8
10^7
typ
10^6
10^5
10^4
10^3
10^2
10
1
10^{-1}
0
250
500
750
V_F (mV)
1000

Fig. 6.

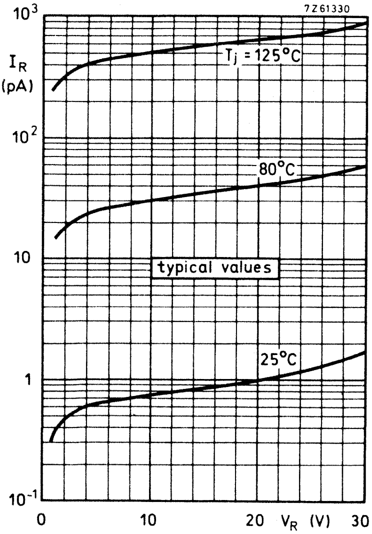

7Z61330
I_R (pA)
T_j = 125°C
80°C
typical values
25°C
V_R (V)
10^3
10^2
10
1
10^{-1}
0
10
20
30

Fig. 7.

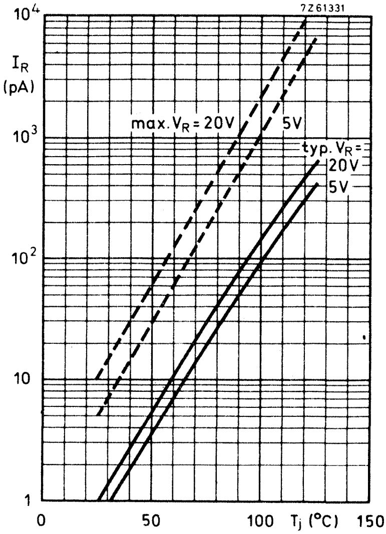

7Z61331
I_R (pA)
max. V_R = 20V
5V
typ. V_R =
20V
5V
T_j (°C)
10^4
10^3
10^2
10
1
0
50
100
150

Fig. 8.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODES

The BAV70 consists of two diodes in a microminiature plastic envelope. The cathodes are commoned and the unit is intended for high-speed switching in thick and thin-film circuits.

QUICK REFERENCE DATA (per diode)

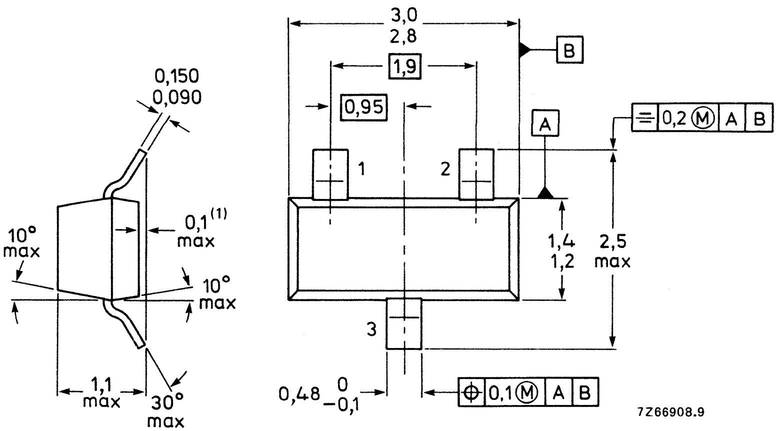
Continuous reverse voltage	V_R	max.	70	V
Repetitive peak reverse voltage	V_{RRM}	max.	70	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Junction temperature	T_j	max.	175	°C
Forward voltage at I_F = 50 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

MECHANICAL DATA Dimensions in mm

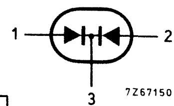
Fig. 1 SOT-23.

Marking code

BAV70 = A4



TOP VIEW



(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations.*

RATINGS (per diode)

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

Continuous reverse voltage	V_R	max.	70	V
Repetitive peak reverse voltage	V_{RRM}	max.	70	V
Average rectified forward current▲ (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250	mA
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}	−65 to +	175	°C
Junction temperature	T_j	max.	175	°C

THERMAL CHARACTERISTICS*

$T_{j1} = P_1 (R_{th\ j\text{-}t}) + T_{tab}$
$T_{j2} = P_2 (R_{th\ j\text{-}t}) + T_{tab}$
$T_{tab} = P_{tot} (R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280	K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90	K/W

CHARACTERISTICS (per diode)

T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 1 mA	V_F	<	715	mV
I_F = 10 mA	V_F	<	855	mV
I_F = 50 mA	V_F	<	1000	mV
I_F = 150 mA	V_F	<	1250	mV
Reverse current				
V_R = 25 V; T_j = 150 °C	I_R	<	60	μA
V_R = 70 V	I_R	<	5	μA
V_R = 70 V; T_j = 150 °C	I_R	<	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	1,5	pF
Forward recovery voltage when switched to				
I_F = 10 mA; t_r = 20 ns	V_{fr}	<	1,75	V

▲ Measured under pulse conditions : pulse time $t_p \leqslant$ 0,5 ms.
For sinusoidal operation $I_{F(AV)}$ = 150 mA; averaging time $t_{(av)} \leqslant$ 1 ms.

* See *Thermal characteristics.*

→ **Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

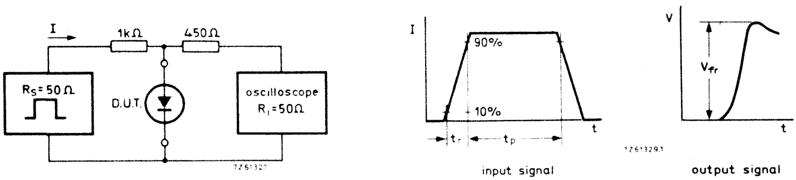


Fig. 2 Test circuit and waveforms; forward recovery voltage.

Input signal : Rise time of the forward pulse t_r = 20 ns; Forward current pulse duration t_p = 120 ns; Duty factor δ = 0,01

Oscilloscope : Rise time t_r = 0,35 ns

Circuit capacitance $C \leqslant 1$ pF (C = oscilloscope input capacitance + parasitic capacitance)

Reverse recovery time when switched from
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω;
measured at I_R = 1 mA | t_{rr} | < | 6 | ns

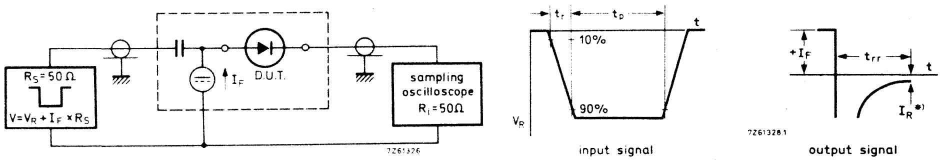


Fig. 3 Test circuit and waveforms; reverse recovery time.

*) I_R = 1 mA

Input signal : Rise time of the reverse pulse t_r = 0,6 ns; reverse pulse duration t_p = 100 ns; duty factor δ = 0,05

Oscilloscope : Rise time t_r = 0,35 ns

Circuit capacitance $C \leqslant 1$ pF (C = oscilloscope input capacitance + parasitic capacitance)

Recovery charge when switched from
I_F = 10 mA to V_R = 5 V; R_L = 500 Ω | Q_s | < | 45 | pC

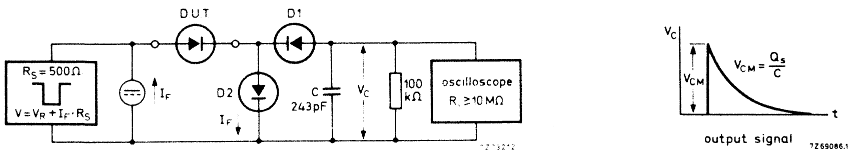


Fig. 4 Test circuit and waveform; recovery charge.

D1 = BAW62

D2 = diode with minority carrier life time at 10 mA: < 200 ps

Input signal : Rise time of the reverse pulse = t_r = 2 ns; Reverse pulse duration = t_p = 400 ns; Duty factor = δ = 0,02

Circuit capacitance $C \leqslant 7$ pF (C = oscilloscope input capacitance + parasitic capacitance)

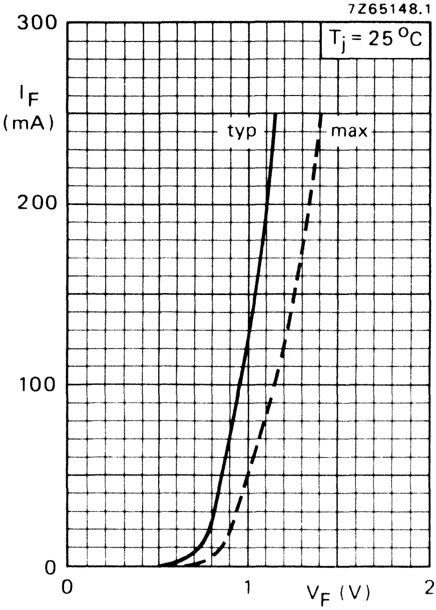


Fig. 5

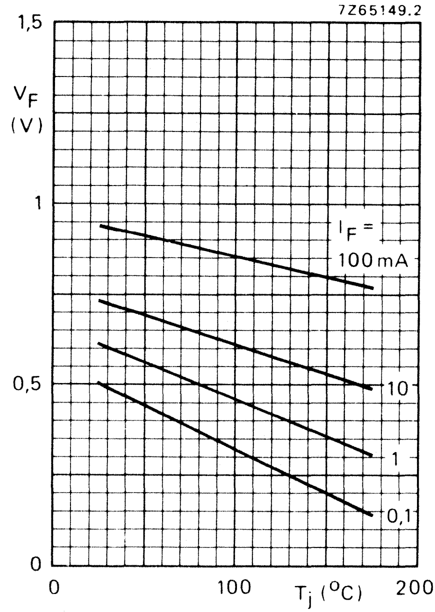


Fig. 6

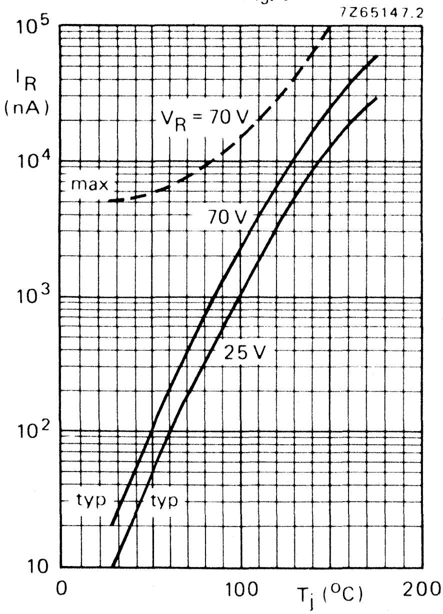


Fig. 7

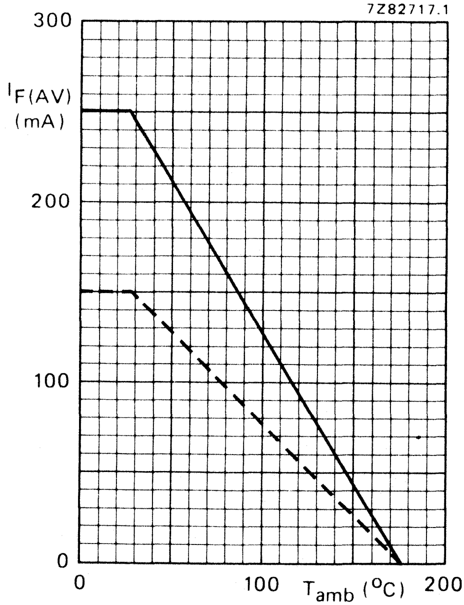


Fig. 8 ——— single diode
– – – – – double diode, equally loaded.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODES

The BAV99 consists of two diodes in a microminiature plastic envelope. The diodes are connected in series and the unit is intended for high-speed switching in thick and thin-film circuits.

QUICK REFERENCE DATA (per diode)

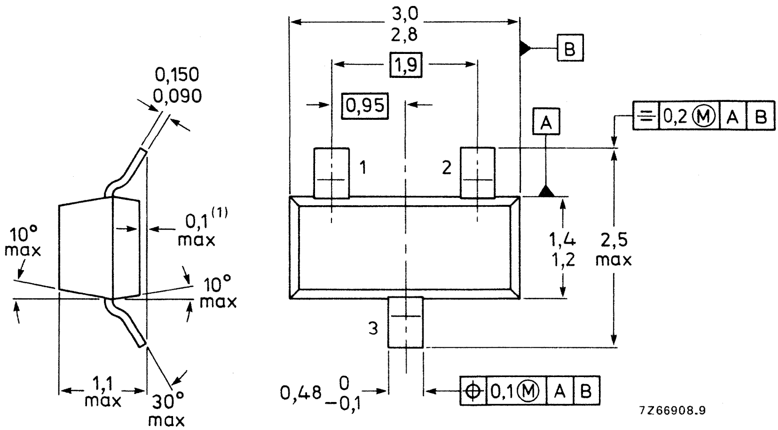
Continuous reverse voltage	V_R	max.	70	V
Repetitive peak reverse voltage	V_{RRM}	max.	70	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Junction temperature	T_j	max.	175	°C
Forward voltage at I_F = 50 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

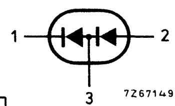
MECHANICAL DATA Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAV99 = A7





TOP VIEW

(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations.*

RATINGS (per diode)

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

Continuous reverse voltage	V_R	max.	70	V
Repetitive peak reverse voltage	V_{RRM}	max.	70	V
Average rectified forward current ▲ (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250	mA
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	250	mA
Storage temperature	T_{stg}	−65 to +175		°C
Junction temperature	T_j	max.	175	°C

THERMAL CHARACTERISTICS *

$T_{j1} = P_1 (R_{th\,j\text{-}t}) + T_{tab}$

$T_{j2} = P_2 (R_{th\,j\text{-}t}) + T_{tab}$

$T_{tab} = P_{tot} (R_{th\,t\text{-}s} + R_{th\,s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\,j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\,t\text{-}s}$	=	280	K/W
From soldering points to ambient **	$R_{th\,s\text{-}a}$	=	90	K/W

CHARACTERISTICS (per diode)

$T_j = 25\ ^oC$ unless otherwise specified

Forward voltage				
$I_F = 1$ mA	V_F	<	715	mV
$I_F = 10$ mA	V_F	<	855	mV
$I_F = 50$ mA	V_F	<	1000	mV
$I_F = 150$ mA	V_F	<	1250	mV
Reverse current				
$V_R = 25$ V; $T_j = 150\ ^oC$	I_R	<	30	μA
$V_R = 70$ V	I_R	<	2,5	μA
$V_R = 70$ V; $T_j = 150\ ^oC$	I_R	<	50	μA
Diode capacitance				
$V_R = 0$; f = 1 MHz	C_d	<	1,5	pF
Forward recovery voltage when switched to $I_F = 10$ mA; $t_r = 20$ ns	V_{fr}	<	1,75	V

▲ Measured under pulse conditions: pulse time $t_p \leqslant 0{,}5$ ms.
For sinusoidal operation $I_{F(AV)} = 150$ mA; averaging time $t_{(av)} \leqslant 1$ ms.

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

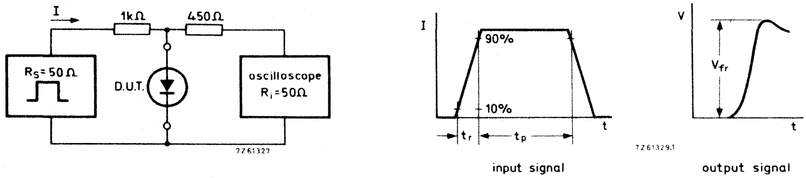


Fig. 2 Test circuit and waveforms; forward recovery voltage.

Input signal: Rise time of the forward pulse t_r = 20 ns;
Forward current pulse duration = t_p = 120 ns. Duty factor = δ = 0,01.
Oscilloscope: Rise time t_r = 0,35 ns.

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

Reverse recovery time when switched from
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω;
measured at I_R = 1 mA | t_{rr} | < | 6 ns

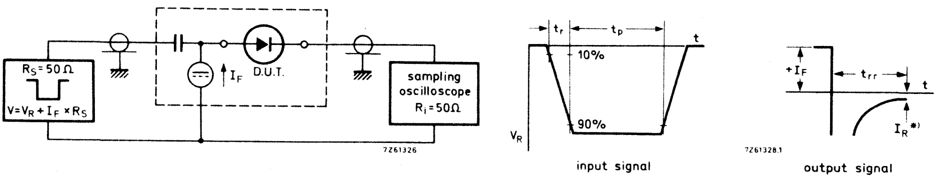


Fig. 3 Test circuit and waveforms; reverse recovery time.

Input signal: Rise time of the reverse pulse t_r = 0,6 ns *) I_R = 1 mA
Reverse pulse duration t_p = 100 ns. Duty factor δ = 0,05.
Oscilloscope: Rise time t_r = 0,35 ns.

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance).

Recovery charge when switched from
I_F = 10 mA to V_R = 5 V; R_L = 500 Ω | Q_s | < | 45 pC

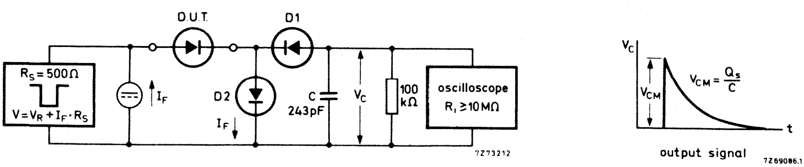


Fig. 4 Test and waveform; recovery charge.

D2 = diode with minority carrier life time at 10 mA: < 200 ps; D1 = BAW62.

Input signal: Rise time of the reverse pulse t_r = 2 ns
Reverse pulse duration t_p = 400 ns. Duty factor δ = 0,02.

Circuit capacitance C ⩽ 7 pF (C = oscilloscope input capacitance + parasitic capacitance).

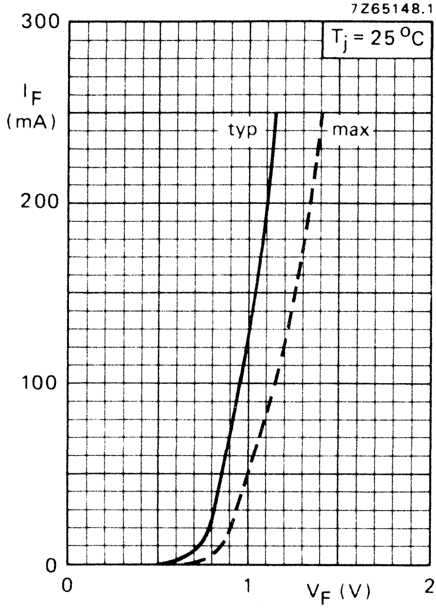


Fig. 5.

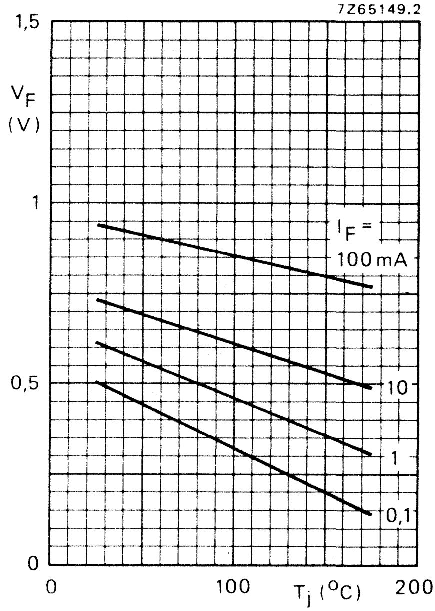


Fig. 6 Typical values.

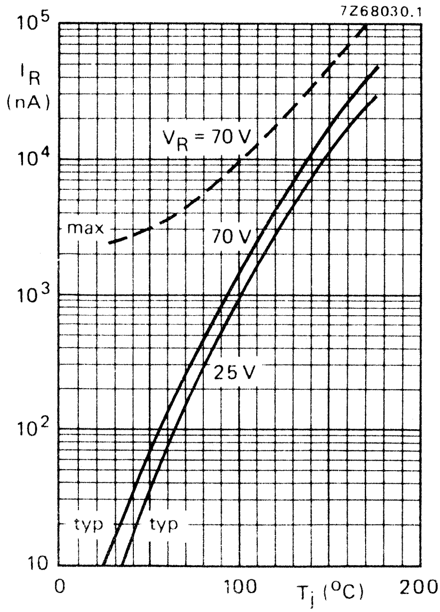


Fig. 7.

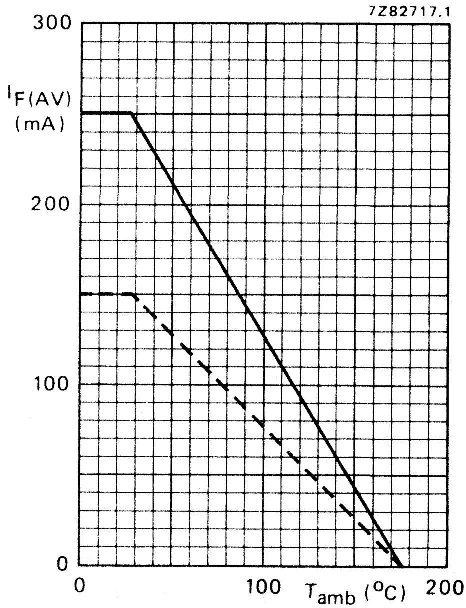


Fig. 8 ——— single diode
– – – – double diode; equally loaded.

GENERAL PURPOSE DIODES FOR SURFACE MOUNTING

Silicon planar epitaxial diodes; intended for switching and general purposes in industrial equipment e.g. oscilloscopes, digital voltmeters and video output stages in colour television.

The SM DIODE is a leadless diode in an hermetically sealed glass envelope with tin plated metal discs at each end. It is suitable for Automatic Placement and as such it can withstand immersion soldering.

The diodes are delivered in "super 8" tape.

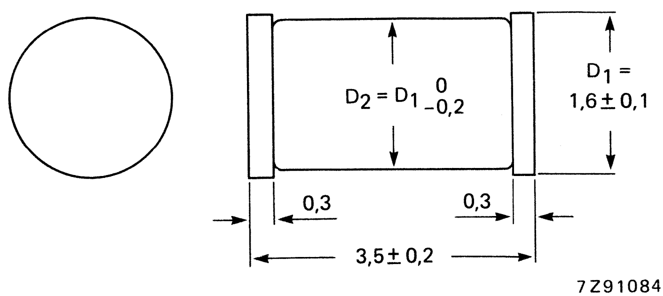
QUICK REFERENCE DATA

			BAV100	BAV101	BAV102	BAV103	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Forward current (d.c.)	I_F	max.			250		mA
Junction temperature	T_j	max.			175		°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=			0,375		K/mW
Forward voltage at I_F = 100 mA	V_F	<			1,0		V
Reverse current at $V_R = V_{Rmax}$	I_R	<			100		nA
Diode capacitance at V_R = 0; f = 1 MHz	C_d	typ.			1,5		pF
		<			5,0		pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<			50		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-80.



The BAV100 cathode is indicated by a green and a black band.
The BAV101 cathode is indicated by a green and a brown band.
The BAV102 cathode is indicated by a green and a red band.
The BAV103 cathode is indicated by a green and an orange band.

RATINGS

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

			BAV100	BAV101	BAV102	BAV103	
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	120	200	250	V

Average rectified forward current	$I_{F(AV)}$	max.	250	mA[1]
Forward current (d.c.)	I_F	max.	250	mA
Repetitive peak forward current	I_{FRM}	max.	625	mA
Non-repetitive peak forward current				
$t < 1$ s; $T_j = 25$ °C	I_{FSM}	max.	1	A
$t = 1$ µs; $T_j = 25$ °C	I_{FSM}	max.	5	A
Total power dissipation up to $T_{amb} = 25$ °C	P_{tot}	max.	400	mW
Storage temperature	T_{stg}		−65 to + 175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,375	K/mW

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

Forward voltage				
$I_F = 100$ mA	V_F	<	1,0	V
$I_F = 200$ mA	V_F	<	1,25	V

			BAV100	BAV101	BAV102	BAV103	
Reverse breakdown voltage $I_R = 100$ µA	$V_{(BR)R}$	>	60	120	200	250	V[2]

Reverse current				
$V_R = V_{Rmax}$	I_R	<	100	nA
$V_R = V_{Rmax}$; $T_j = 150$ °C	I_R	<	100	µA
Differential resistance				
$I_F = 10$ mA	r_{diff}	typ.	5	Ω
Diode capacitance				
$V_R = 0$; $f = 1$ MHz	C_d	typ.	1,5	pF
		<	5,0	pF
Reverse recovery time when switched from $I_F = 30$ mA to $I_R = 30$ mA; $R_L = 100$ Ω; measured at $I_R = 3$ mA	t_{rr}	<	50	ns

[1]) For sinusoidal operation see Figs 7 to 10. For pulse operation see Figs 3 to 6.

[2]) At zero life time, measured under pulse conditions to avoid excessive dissipation and voltage limited at 275 V.

Test circuit and waveforms:

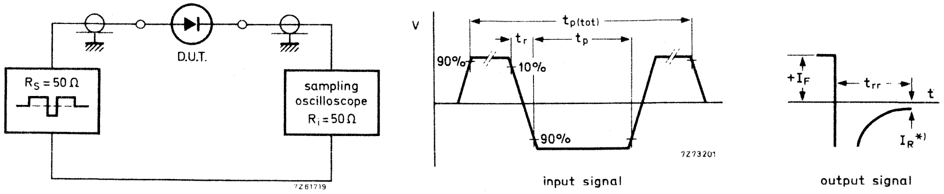


Fig. 2.

*) $I_R = 3$ mA

Input signal:	Total pulse duration	$t_{p(tot)}$	=	2 μs
	Duty factor	δ	=	0,0025
	Rise time of the reverse pulse	t_r	=	0,6 ns
	Reverse pulse duration	t_p	=	100 ns
Oscilloscope:	Rise time	t_r	=	0,35 ns

Circuit capacitance $C \leqslant 1$ pF (C = oscilloscope input capacitance + parasitic capacitance)

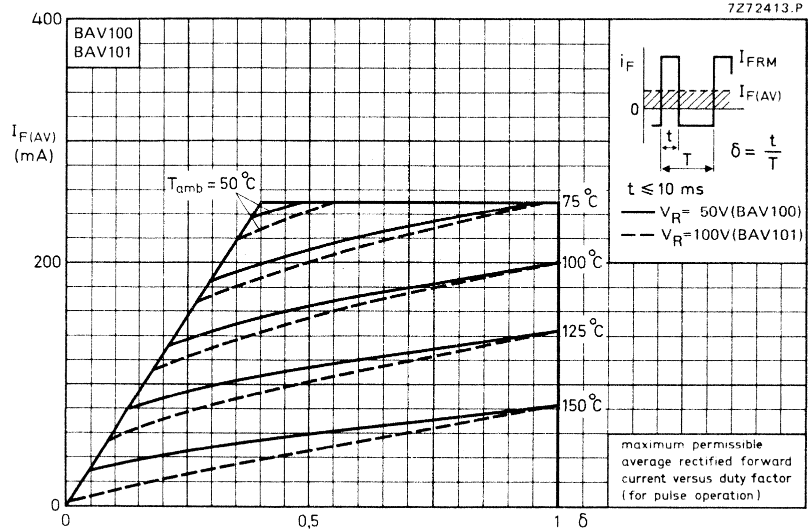

7Z72413.P
400
200
0
IF(AV)
(mA)
BAV100
BAV101
Tamb = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
iF
IFRM
IF(AV)
0
t
T
δ = t/T
t ≤ 10 ms
VR= 50V(BAV100)
VR=100V(BAV101)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 3.

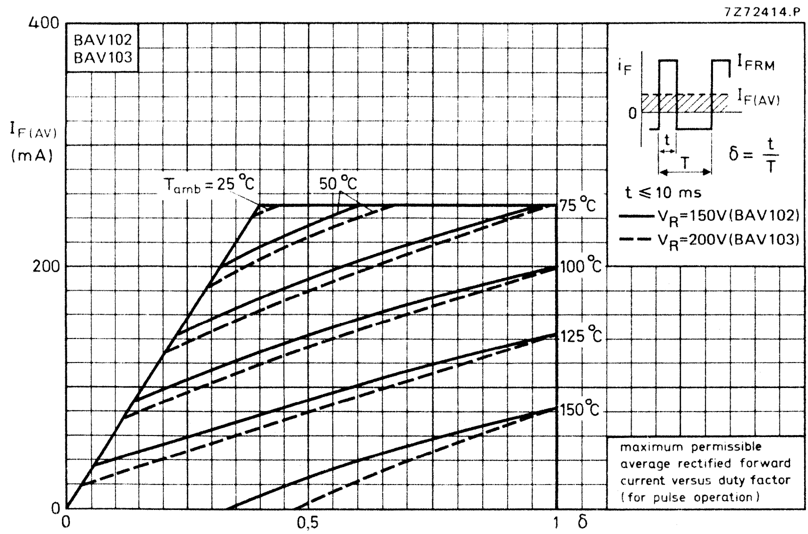
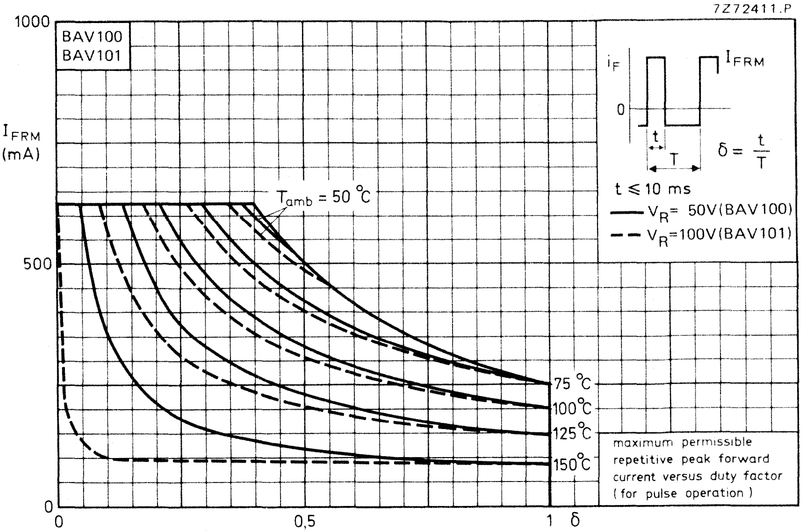
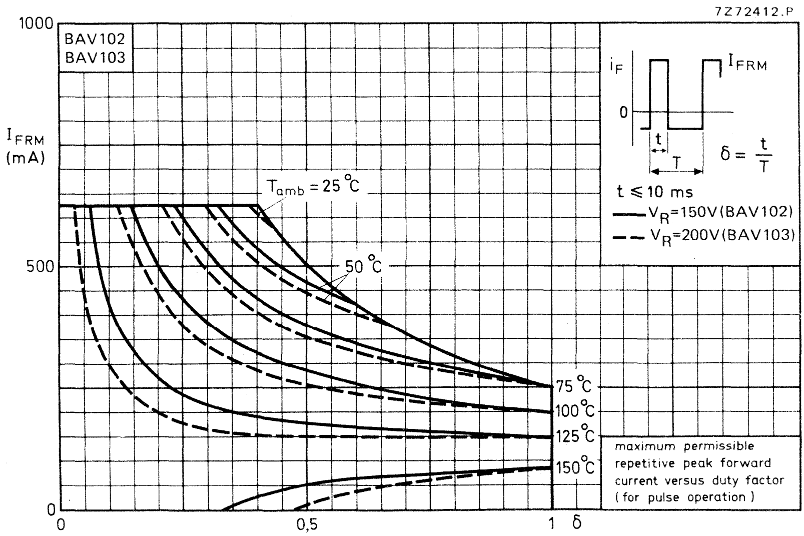

7Z72414.P
400
200
0
IF(AV)
(mA)
BAV102
BAV103
Tamb = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
iF
IFRM
IF(AV)
0
t
T
δ = t/T
t ≤ 10 ms
VR=150V(BAV102)
VR=200V(BAV103)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 4.



7Z72411.P
1000
500
0
I FRM (mA)
BAV100
BAV101
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50V(BAV100)
V_R = 100V(BAV101)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 5.



7Z72412.P
1000
500
0
I FRM (mA)
BAV102
BAV103
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 150V(BAV102)
V_R = 200V(BAV103)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 6.

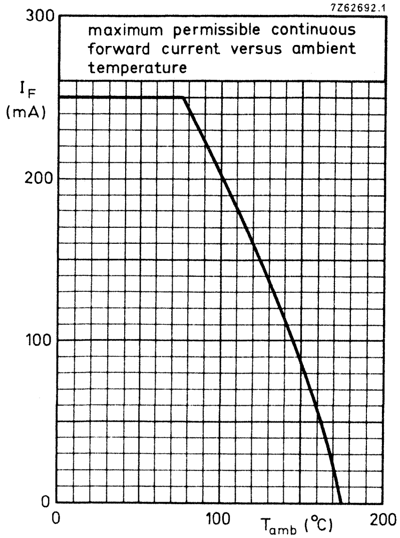


Fig. 7.

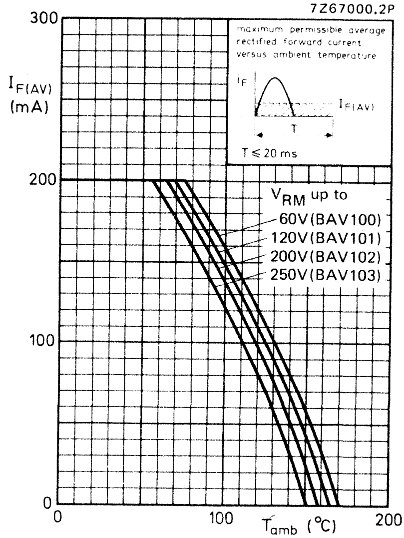


Fig. 8.

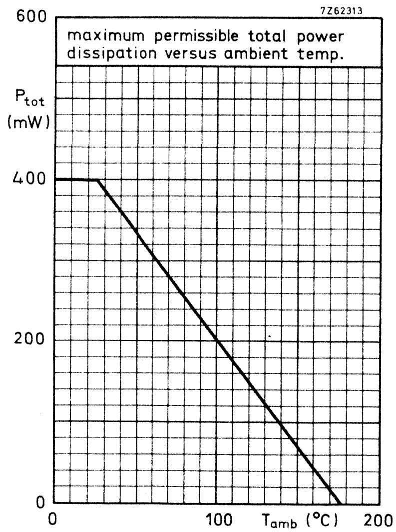


Fig. 9.

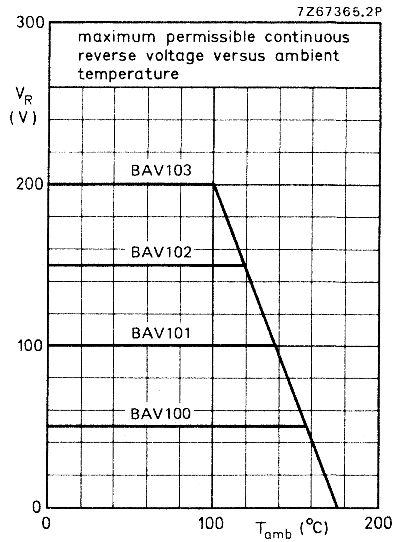


Fig. 10.

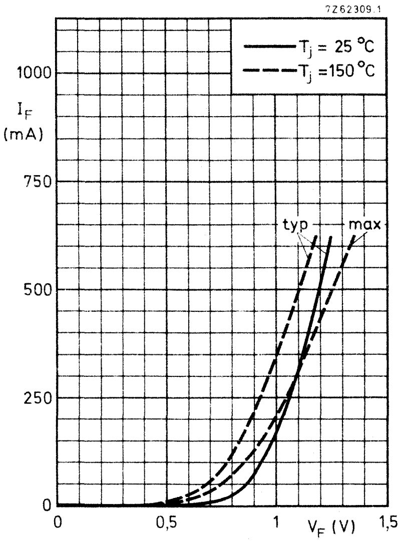


Fig. 11.

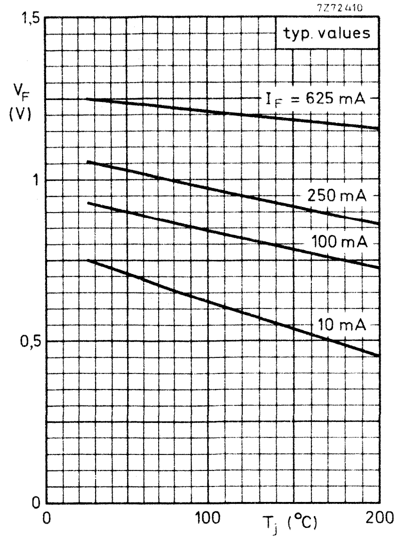


Fig. 12.

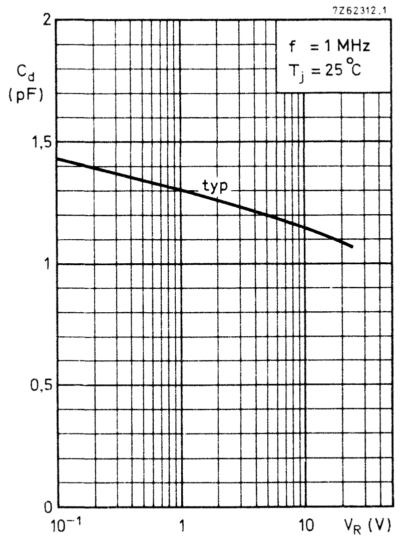


Fig. 13.

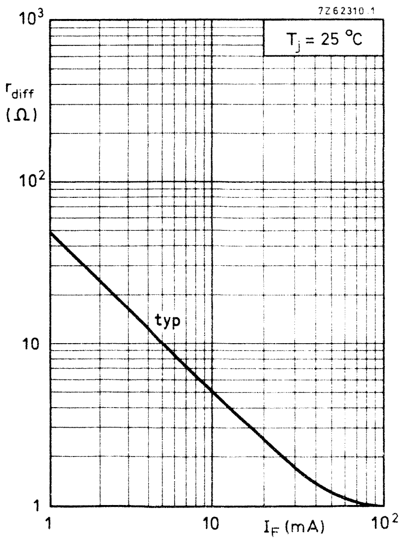


Fig. 14.

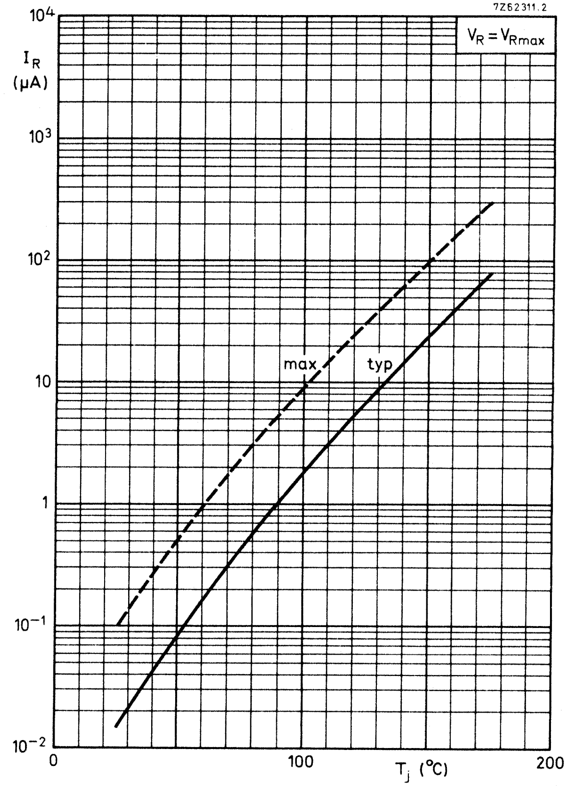

7Z62311.2
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

Fig. 15.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODES

The BAW56 consists of two diodes in a microminiature plastic envelope. The anodes are commoned and the unit is intended for high-speed switching in thick and thin-film circuits.

QUICK REFERENCE DATA (per diode)

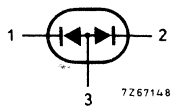
Continuous reverse voltage	V_R	max.	70	V
Repetitive peak reverse voltage	V_{RRM}	max.	70	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Junction temperature	T_j	max.	175	°C
Forward voltage at I_F = 50 mA	V_F	<	1,0	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	6	ns
Recovery charge when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	Q_s	<	45	pC

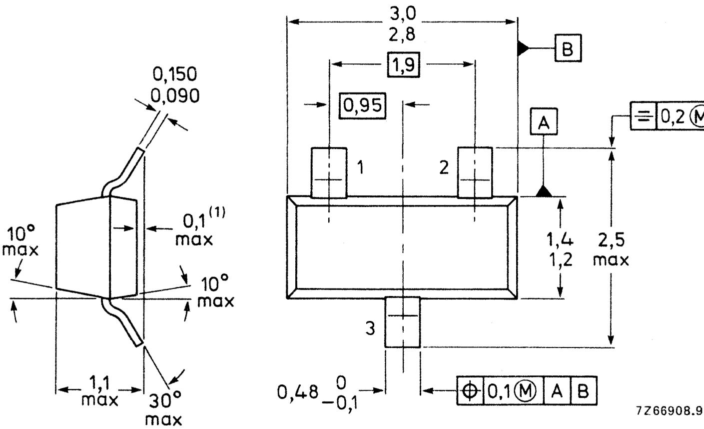
MECHANICAL DATA Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAW56 = A1





TOP VIEW

(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations.*

RATINGS (per diode)

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

Continuous reverse voltage	V_R	max.	70 V
Repetitive peak reverse voltage	V_{RRM}	max.	70 V
Average rectified forward current ▲ (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250 mA
Forward current (d.c.)	I_F	max.	250 mA
Repetitive peak forward current	I_{FRM}	max.	250 mA
Storage temperature	T_{stg}	−65 to +175 °C	
Junction temperature	T_j	max.	175 °C

THERMAL CHARACTERISTICS *

$T_{j1} = P_1 (R_{th\ j\text{-}t}) + T_{tab}$

$T_{j2} = P_2 (R_{th\ j\text{-}t}) + T_{tab}$

$T_{tab} = P_{tot} (R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60 K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	2 x 280 K/W
From soldering points to ambient **	$R_{th\ s\text{-}a}$	=	2 x 90 K/W

CHARACTERISTICS (per diode)

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 1 mA	V_F	<	715 mV
I_F = 10 mA	V_F	<	855 mV
I_F = 50 mA	V_F	<	1000 mV
I_F = 150 mA	V_F	<	1250 mV
Reverse current			
V_R = 25 V; T_j = 150 °C	I_R	<	30 μA
V_R = 70 V	I_R	<	2,5 μA
V_R = 70 V; T_j = 150 °C	I_R	<	50 μA
Diode capacitance			
V_R = 0; f = 1 MHz	C_d	<	2 pF
Forward recovery voltage when switched to I_F = 10 mA; t_r = 20 ns	V_{fr}	<	1,75 V

▲ Measured under pulse conditions: pulse time $t_p \leq$ 0,5 ms.
For sinusoidal operation $I_{F(AV)}$ = 150 mA; averaging time $t_{(av)} \leq$ 1 ms.

* See *Thermal characteristics.*

→ ** Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

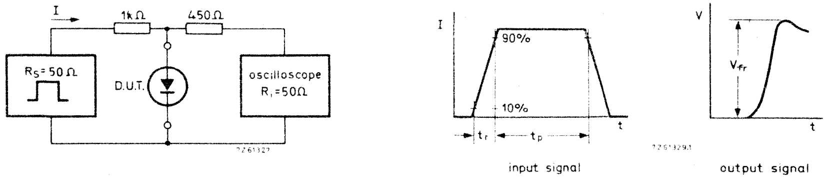


Fig. 2 Test circuit and waveforms; forward recovery voltage.

Input signal: Rise time of the forward pulse t_r = 20 ns
Forward current pulse duration t_p = 120 ns. Duty factor δ = 0,01
Oscilloscope: Rise time t_r = 0,35 ns.

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Reverse recovery time when switched from
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω;
measured at I_R = 1 mA t_{rr} < 6 ns

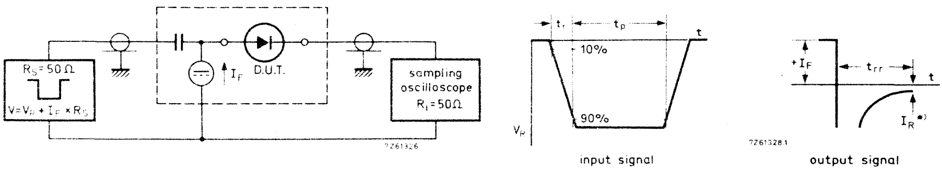


Fig. 3 Test circuit and waveforms; reverse recovery time.

*) I_R = 1 mA

Input signal: Rise time of the reverse pulse t_r = 0,6 ns
Reverse pulse duration t_p = 100 ns. Duty factor δ = 0,05.
Oscilloscope: Rise time t_r = 0,35 ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Recovery charge when switched from
I_F = 10 mA to V_R = 5 V; R_L = 500 Ω Q_s < 45 pC

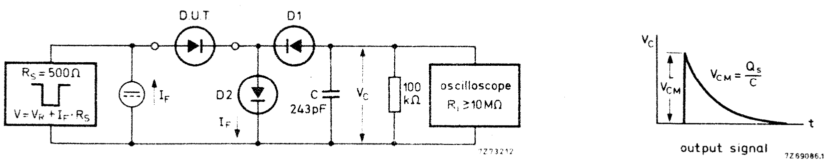


Fig. 4 Test circuit and waveform; recovery charge.

D2 = diode with minority carrier life time at 10 mA: < 200 ps. D1 = BAW62.

Input signal: Rise time of the reverse pulse t_r = 2 ns
Reverse pulse duration t_p = 400 ns. Duty factor δ = 0,02

Circuit capacitance C ⩽ 7 pF (C = oscilloscope input capacitance + parasitic capacitance).

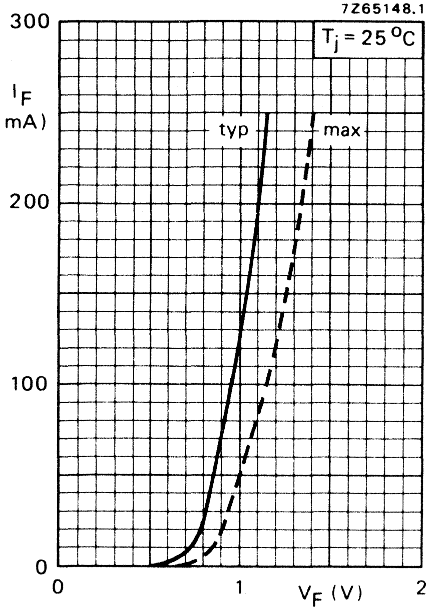


Fig. 5.

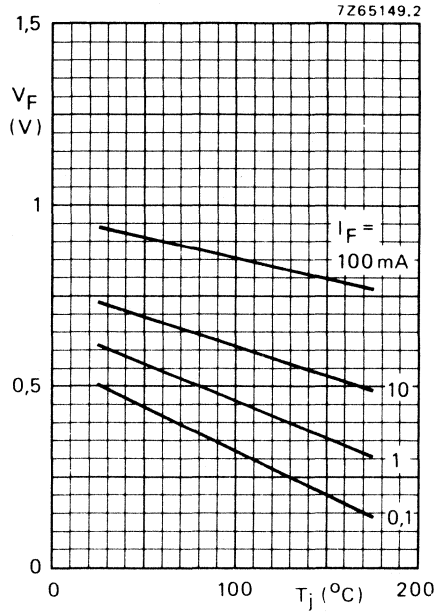


Fig. 6 Typical values.

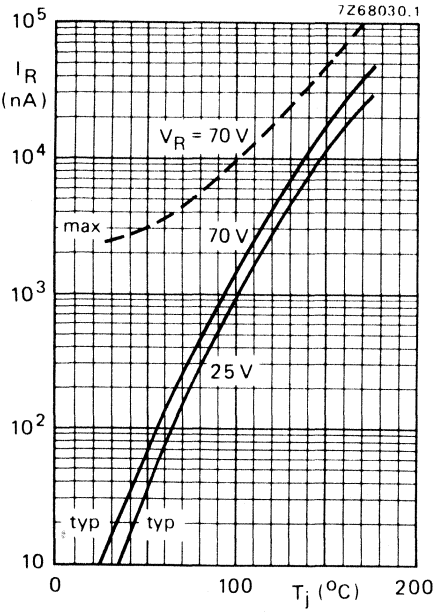


Fig. 7.

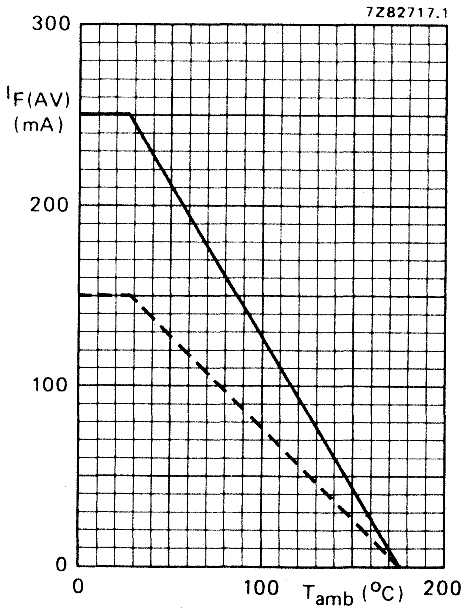


Fig. 8 ——— single diode;
– – – – double diode, equally loaded.

HIGH-SPEED SILICON DIODE

Planar epitaxial high-speed diode in a DO-35 envelope. The BAW62 is primarily intended for fast logic applications.

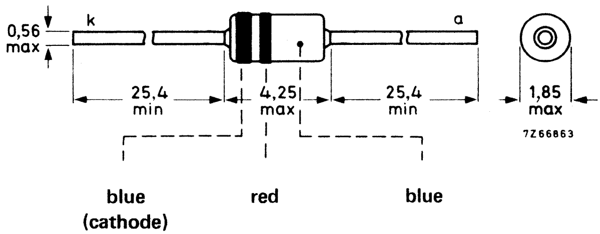
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Repetitive peak forward current	I_{FRM}	max.	450	mA
Junction temperature	T_j	max.	200	°C
Forward voltage at I_F = 100 mA	V_F	<	1	V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



Diodes may be either type-branded or colour-coded.

Products, approved to CECC 50 001-021, available on request.

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

Voltages

Continuous reverse voltage	V_R	max.	75	V	
Repetitive peak reverse voltage	V_{RRM}	max.	75	V	[1]

Currents

Average rectified forward current	$I_{F(AV)}$	max.	150	mA	[2]
Forward current (d.c.)	I_F	max.	200	mA	
Repetitive peak forward current	I_{FRM}	max.	450	mA	
Non-repetitive peak forward current; t = 1 μs	I_{FSM}	max.	2000	mA	
t = 1 s	I_{FSM}	max.	500	mA	

Temperatures

Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air at maximum lead length	$R_{th\ j\text{-}a}$	=	0,6	°C/mW

CHARACTERISTICS T_j = 25 °C unless otherwise specified

Forward voltages

I_F = 5 mA	V_F		0,62 to 0,75	V
I_F = 100 mA	V_F	<	1,00	V
I_F = 100 mA; T_j = 100 °C	V_F	<	0,93	V

Reverse currents

V_R = 20 V	I_R	<	25	nA
V_R = 20 V; T_j = 150 °C	I_R	<	50	μA
V_R = 50 V	I_R	<	200	nA
V_R = 75 V	I_R	<	5	μA
V_R = 75 V; T_j = 150 °C	I_R	<	100	μA

Diode capacitance

V_R = 0; f = 1 MHz	C_d	<	2	pF

1) Measured at zero life time at I_R = 100 μA; V_R > 100 V.

2) For pulse operation see Figs 5 and 6. For sinusoidal operation see Figs7 to 10.

CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Forward recovery voltage when switched to

$I_F = 50$ mA; $t_r = 20$ ns V_{fr} < 2,5 V

Test circuit and waveforms:

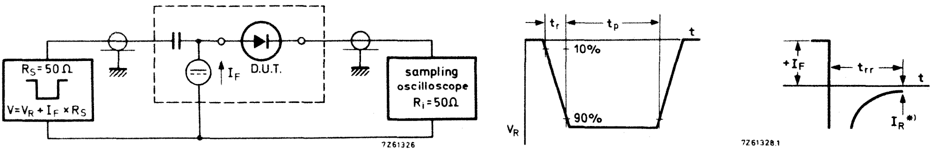


Fig. 3. input signal output signal

Input signal	: Rise time of the forward pulse	t_r	=	20 ns
	Forward current pulse duration	t_p	=	120 ns
	Duty factor	δ	=	0,01
Oscilloscope	: Rise time	t_r	=	0,35 ns

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Reverse recovery time when switched from

$I_F = 10$ mA to $I_R = 10$ mA; $R_L = 100\ \Omega$;
measured at $I_R = 1$ mA t_{rr} < 4 ns

Test circuit and waveforms:

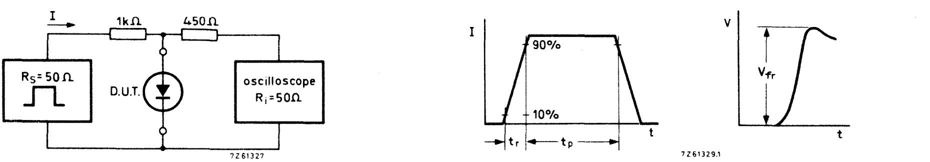


Fig. 2. input signal output signal

Input signal	: Rise time of the reverse pulse	t_r	=	0,6 ns	*) $I_R = 1$ mA
	Reverse pulse duration	t_p	=	100 ns	
	Duty factor	δ	=	0,05	
Oscilloscope:	Rise time	t_r	=	0,35 ns	

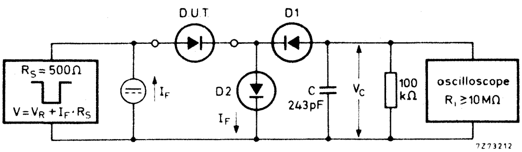
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

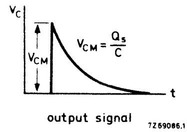
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Recovery charge when switched from

$I_F = 10$ mA to $V_R = 5$ V; $R_L = 500\ \Omega$ | Q_s typ. 50 pC

Test circuit and waveform:





D1 = D2 = BAW62

Fig. 4.

Input signal	: Rise time of the reverse pulse	t_r	=	2 ns
	Reverse pulse duration	t_p	=	400 ns
	Duty factor	δ	=	0,02

Circuit capacitance C ≤ 7 pF (C = oscilloscope input capacitance + parasitic capacitance)

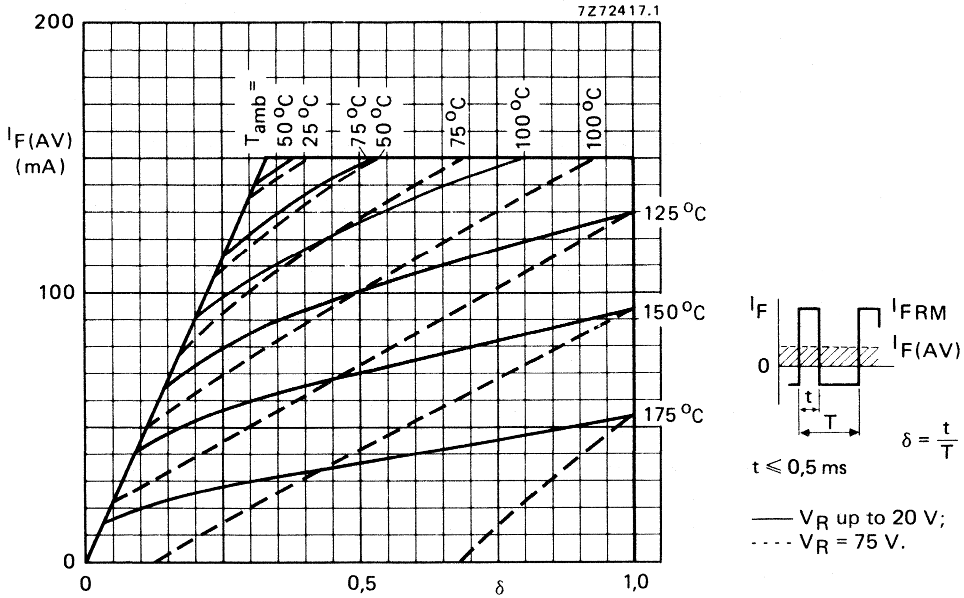


Fig. 5 Maximum permissible average rectified forward current as a function of the duty factor (pulse operated).

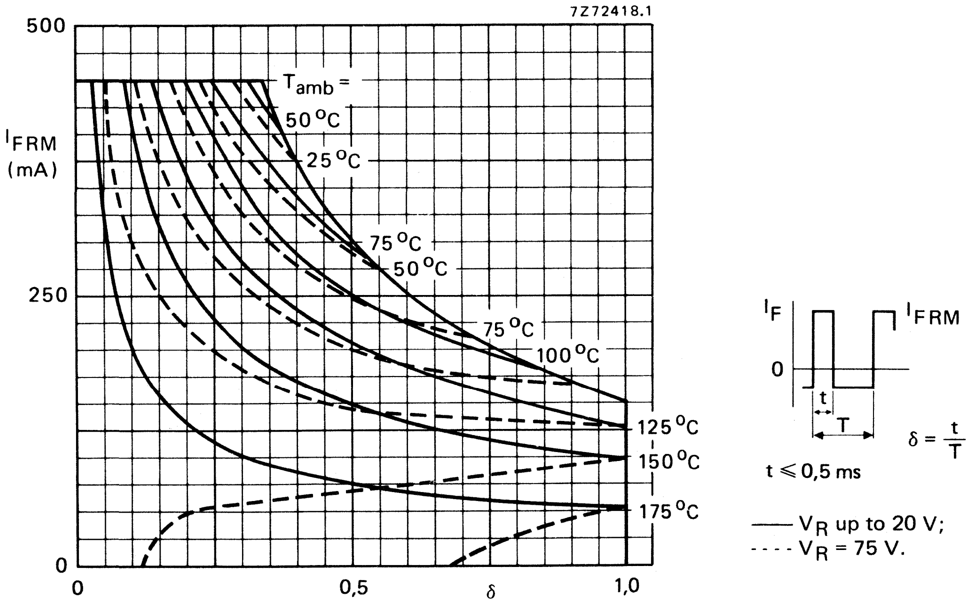


Fig. 6 Maximum permissible repetitive peak forward current as a function of the duty factor (pulse operated).

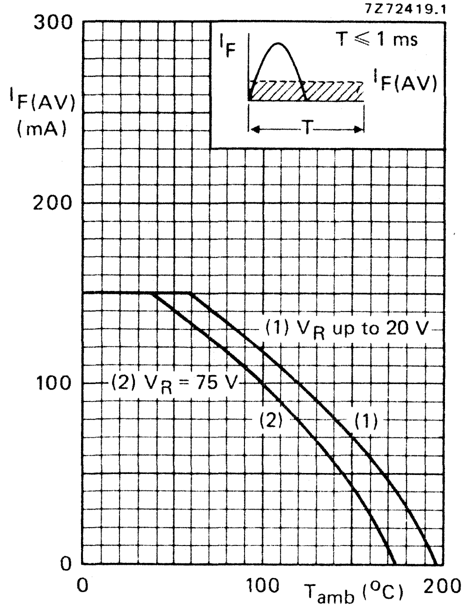


Fig. 7 Maximum permissible average rectified forward current.

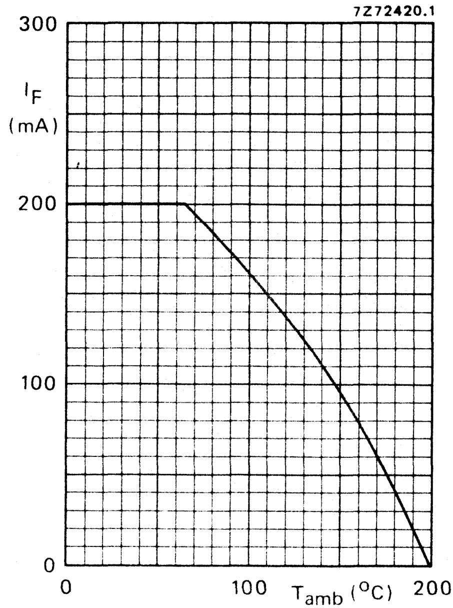


Fig. 8 Maximum permissible continuous forward current.

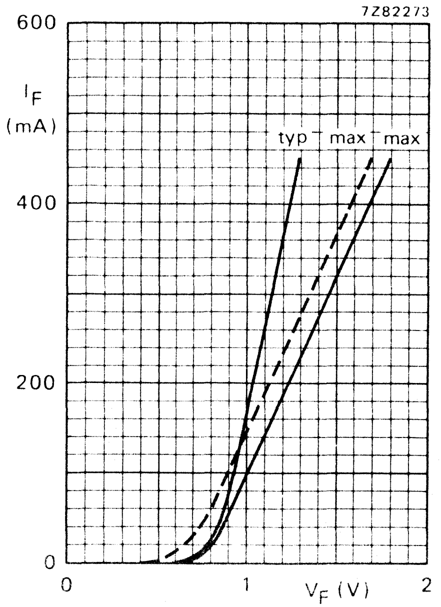


Fig. 9 Forward current as a function forward voltage. —— T_j = 25 °C; – – – T_j = 175 °C.

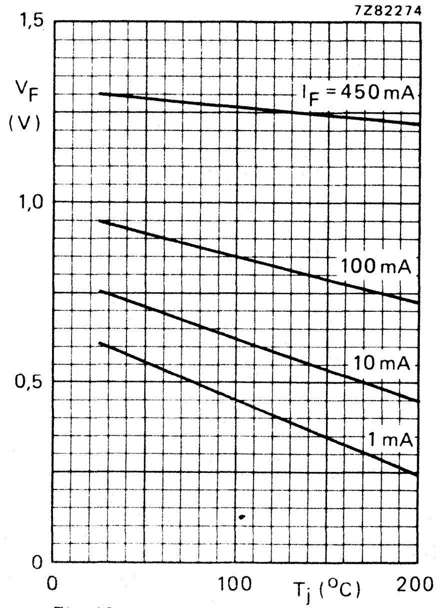
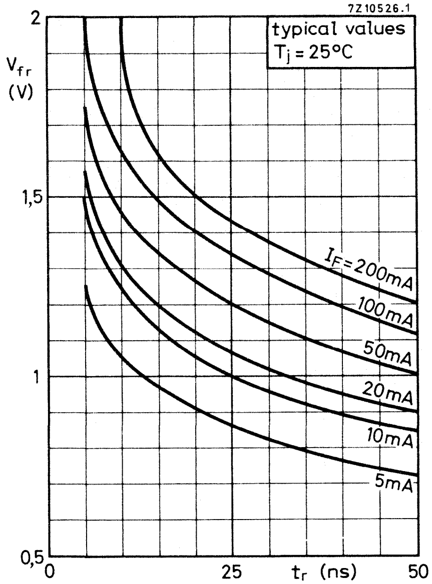
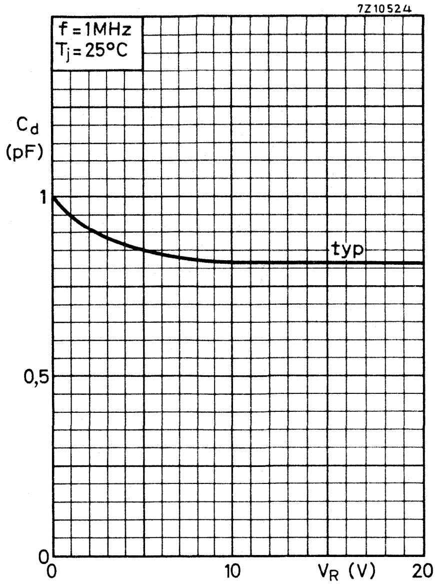
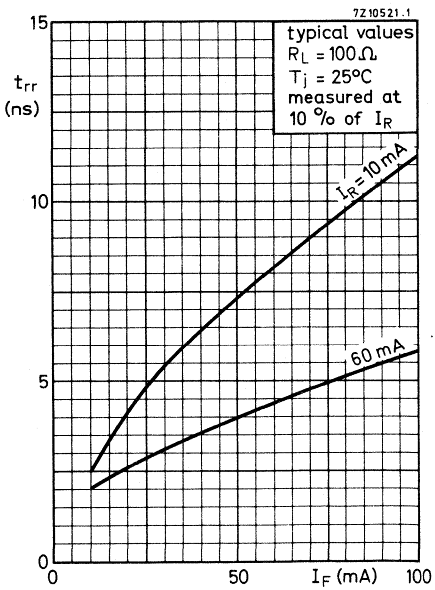
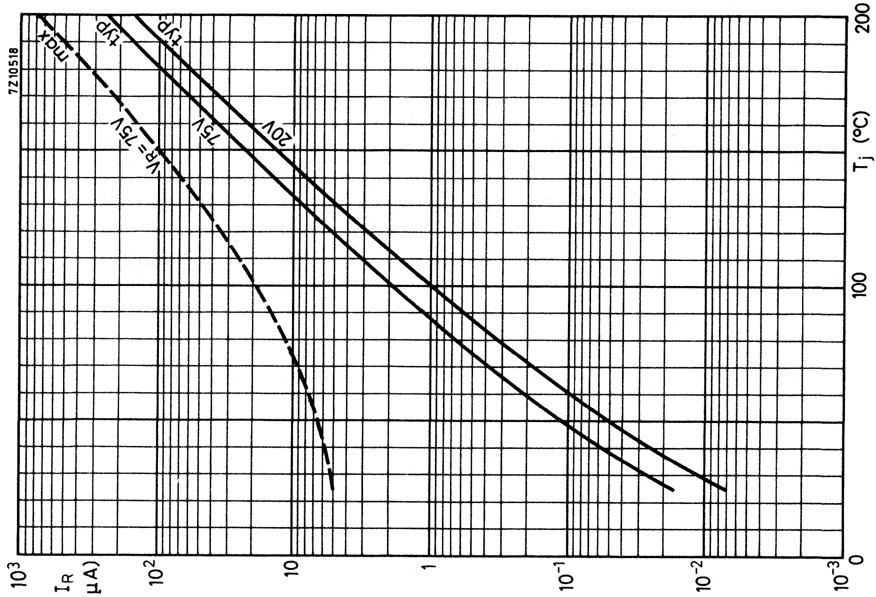


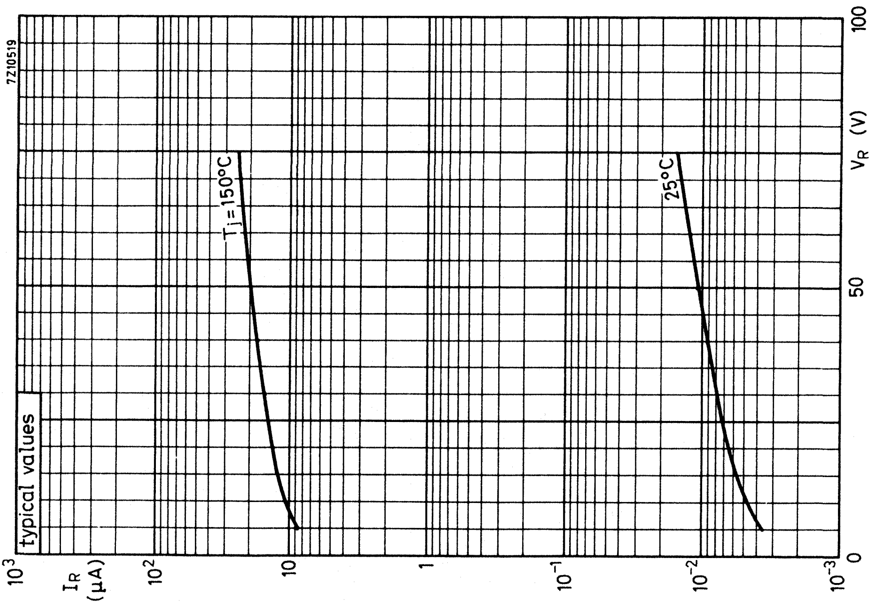
Fig. 10 Typical values forward voltage as a function of junction temperature.


7Z10526.1
typical values
$T_j = 25°C$
V_{fr} (V)
2
1,5
1
0,5
0
25
50
t_r (ns)
$I_F = 200mA$
100mA
50mA
20mA
10mA
5mA


7Z10524
f = 1MHz
$T_j = 25°C$
C_d (pF)
1
0,5
0
10
20
V_R (V)
typ


7Z10521.1
typical values
$R_L = 100\Omega$
$T_j = 25°C$
measured at
10 % of I_R
t_{rr} (ns)
15
10
5
0
50
100
I_F (mA)
$I_R = 10$ mA
60 mA


7Z10518
max
typ
typ
V_R = 75V
75V
20V
T_j (°C)
200
100
0
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}


7Z10519
typical values
T_j = 150°C
25°C
V_R (V)
100
50
0
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}

SILICON PLANAR EPITAXIAL CONTROLLED-AVALANCHE DIODE

A planar epitaxial diode in a DO-35 envelope, capable of absorbing transients repetitively. It is a fast, controlled avalanche diode, intended for switching inductive loads e.g. in semi-electronic telephone exchanges.

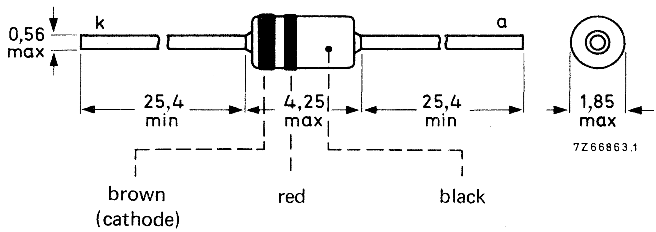
QUICK REFERENCE DATA

Repetitive peak forward current	I_{FRM}	max.	0,8	A
Repetitive peak reverse energy $t_p \geqslant 50\ \mu s$; $f \leqslant 20$ Hz; $T_j = 25\ ^oC$	E_{RRM}	max.	5,0	mJ
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38	K/mW
Forward voltage at $I_F = 200$ mA	V_F	<	1,00	V
Reverse avalanche breakdown voltage $I_R = 1$ mA	$V_{(BR)R}$		120 to 175	V
Reverse recovery time when switched from $I_F = 30$ mA to $I_R = 30$ mA; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA	t_{rr}	<	50	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



RATINGS

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

Continuous reverse voltage*	V_R	max.	90	V
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	0,4	A
Forward current (d.c.)	I_F	max.	0,4	A
Repetitive peak forward current	I_{FRM}	max.	0,8	A
Non-repetitive peak forward current				
$t = 1\ \mu s$; $T_j = 25\ ^oC$ prior to surge	I_{FSM}	max.	6,0	A
$t = 1\ s$; $T_j = 25\ ^oC$ prior to surge	I_{FSM}	max.	1,5	A
Repetitive peak reverse current	I_{RRM}	max.	0,6	A
Repetitive peak reverse energy $t_p \geqslant 50\ \mu s$; $f \leqslant 20$ Hz; $T_j = 25\ ^oC$	E_{RRM}	max.	5,0	mJ
Storage temperature	T_{stg}		−65 to +200	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,38	K/mW
From junction to ambient in free air $T_{lead} = 25\ ^oC$ at 8 mm from the body	$R_{th\ j\text{-}a}$	=	0,30	K/mW

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Forward voltage				
$I_F = 10$ mA	V_F	<	0,75	V
$I_F = 50$ mA	V_F	<	0,84	V
$I_F = 100$ mA	V_F	<	0,90	V
$I_F = 200$ mA	V_F	<	1,00	V
$I_F = 400$ mA	V_F	<	1,25	V
Reverse avalanche breakdown voltage $I_R = 1$ mA	$V_{(BR)R}$		120 to 175	V
Reverse current				
$V_R = 90$ V	I_R	<	100	nA
$V_R = 90$ V; $T_j = 150\ ^oC$	I_R	<	100	μA
Diode capacitance $V_R = 0$; $f = 1$ MHz	C_d	typ.	15	pF
		<	35	pF

* It is allowed to exceed this value as described on page 226. Care should be taken not to exceed the I_{RRM} rating.

Reverse recovery time when switched from
I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω;
measured at I_R = 3 mA t_{rr} < 50 ns

Test circuit and waveforms:

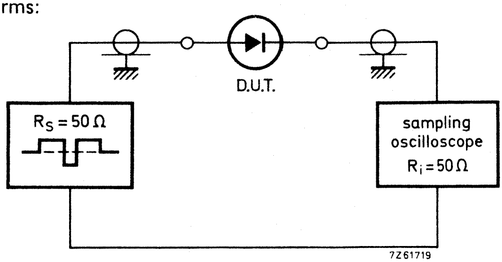


Fig. 2 Test circuit for t_{rr} measurement.

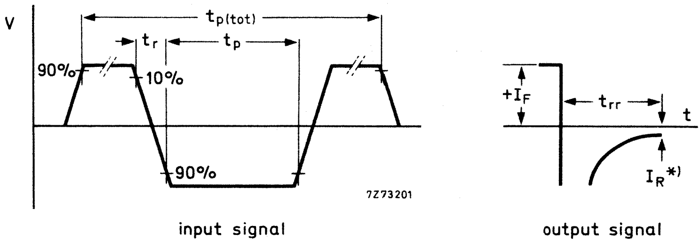


Fig. 3 Waveforms t_{rr} measurement. *I_R = 3 mA.

Input signal:

Total pulse duration	$t_{p(tot)}$	=	2	μs
Duty factor	δ	=	0,0025	
Rise time of the reverse pulse	t_r	=	0,6	ns
Reverse pulse duration	t_p	=	100	ns
Oscilloscope: Rise time	t_r	=	0,35	ns

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Reverse voltages higher than the V_R ratings are allowed, provided:

a. the transient energy ⩽ 7,5 mJ at P_{RRM} ⩽ 30 W; T_j = 25 °C
   the transient energy ⩽ 5 mJ at P_{RRM} = 120 W; T_j = 25 °C (see Fig. 8).

b. T ⩾ 50 ms; δ ⩽ 0,01 (rectangular waveform)
   δ ⩽ 0,02 (triangular waveform).

With increasing temperature, the maximum permissible transient energy must be decreased by 0,03 mJ/K.

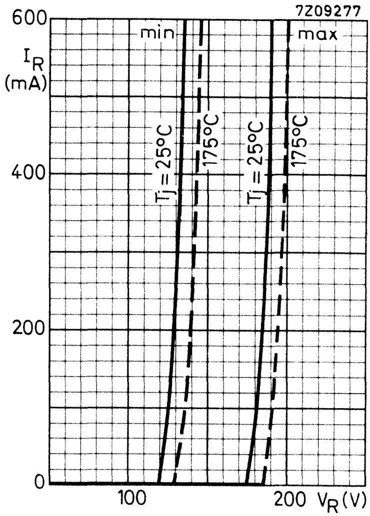


Fig. 4.

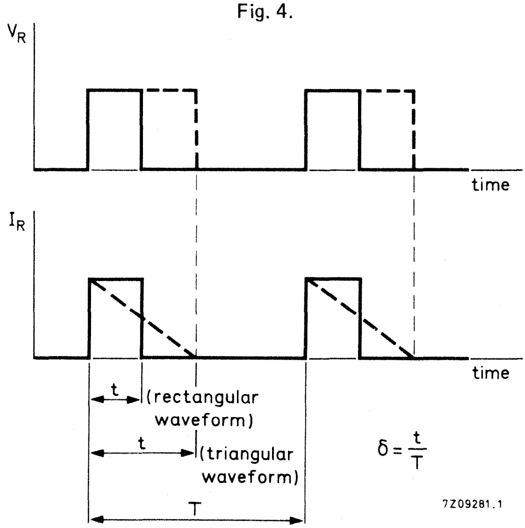


Fig. 5.

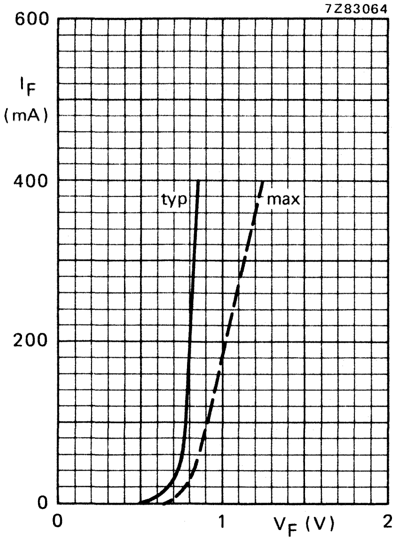


Fig. 6 I_F as a function of V_F at T_j = 25 °C.

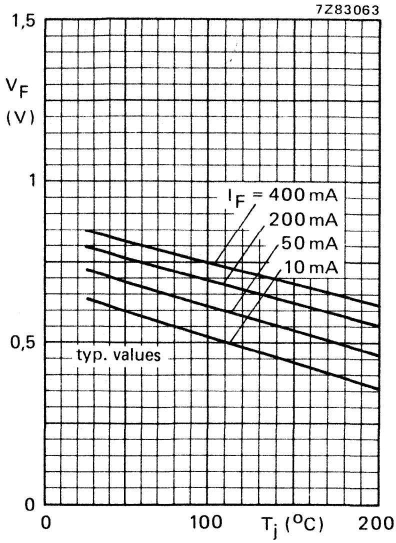


Fig. 7 V_F as a function of T_j.

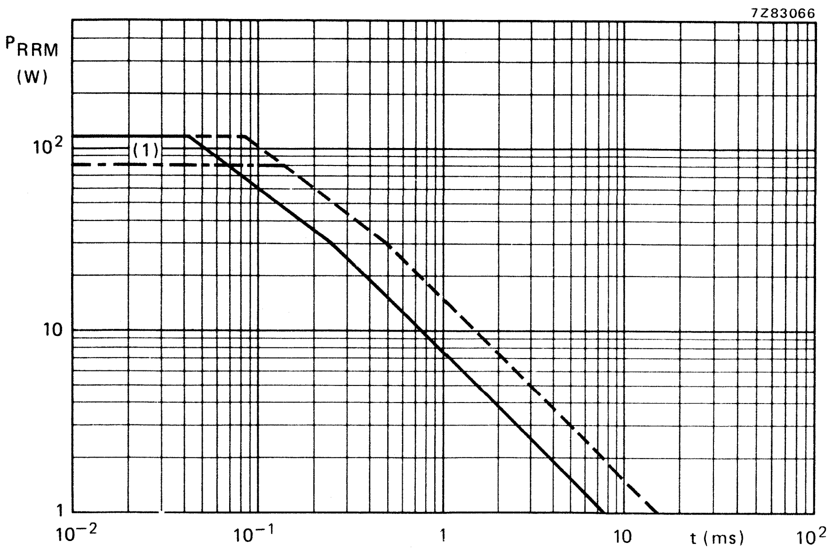


Fig. 8 Maximum permissible repetitive peak reverse power as a function of the pulse duration T ⩾ 50 ms; T_j = 25 °C. ——— rectangular waveform; $\delta \leqslant 0{,}01$; – – – triangular waveform; $\delta \leqslant 0{,}02$.

(1) Limited by I_{RRM} = 600 mA.

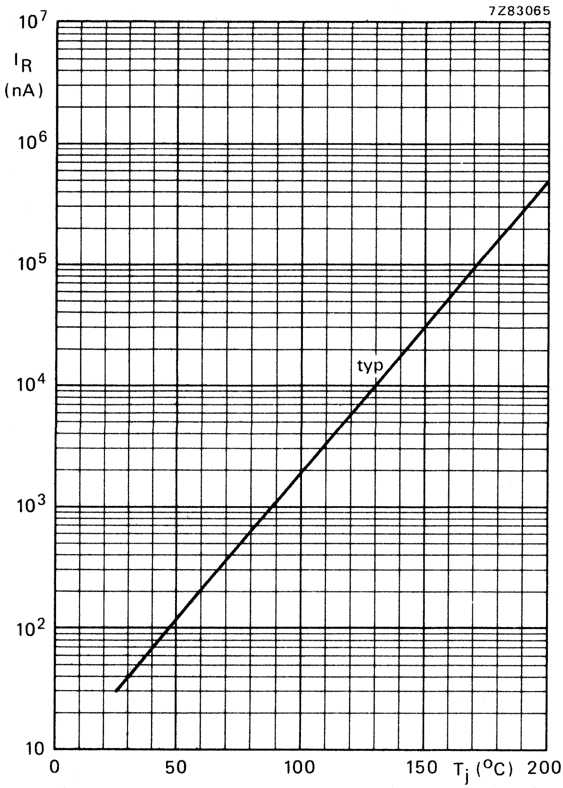


Fig. 9 Typical values reverse current as a function of junction temperature at $V_R = 90$ V.

GENERAL PURPOSE DIODE

General purpose diode in a DO-35 envelope intended for low-voltage switching and rectifier applications, but owing to its steep forward voltage curve also suitable for low-voltage stabilizing.

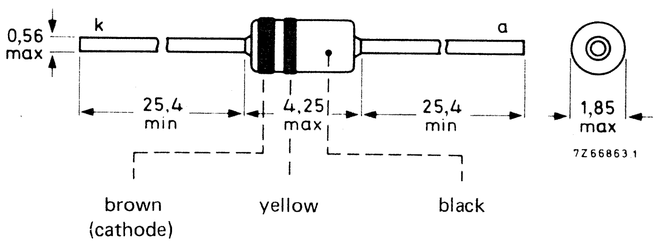
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	40	V
Average forward current	$I_{F(AV)}$	max.	400	mA
Non-repetitive peak forward current	I_{FSM}	max.	6,0	A
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



RATINGS

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

Repetitive peak reverse voltage	V_{RRM}	max.	40 V
Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	500 mA
Average forward current (averaged over any 20 ms period) see Fig. 6	$I_{F(AV)}$	max.	400 mA
Repetitive peak forward current	I_{FRM}	max.	2,0 A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) T_j = 25 °C prior to surge	I_{FSM}	max.	6,0 A
Storage temperature	T_{stg}	–65 to	+200 °C
Junction temperature	T_j	max.	200 °C

THERMAL RESISTANCE

From junction to ambient in free air

at maximum lead length	$R_{th\,j\text{-}a}$	=	0,38 K/mW
at T_{lead} = 25 °C at 8 mm from the body	$R_{th\,j\text{-}a}$	=	0,30 K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage			
I_F = 1 mA	V_F	520 to	600 mV
I_F = 300 mA	V_F	750 to	1000 mV
I_F = 2000 mA; T_j = 150 °C	V_F	<	1500 mV
Reverse current			
V_R = 20 V	I_R	<	100 nA
V_R = 20 V; T_j = 150 °C	I_R	<	100 μA
Diode capacitance			
V_R = 0; f = 1 MHz	C_d	typ.	20 pF
		<	35 pF

Reverse recovery time when switched from
I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω;
measured at I_R = 3 mA t_{rr} < 50 ns

Test circuit and waveforms:

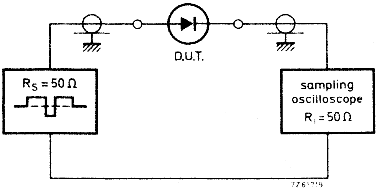


Fig. 2.

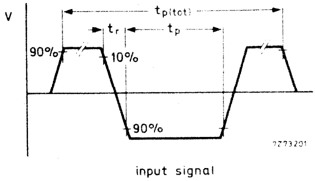


Fig. 3.

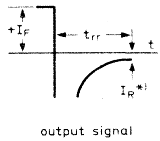


Fig. 4.

Input signal:	Total pulse duration	$t_{p(tot)}$	=	2 μs
	Duty factor	δ	=	0,0025
	Rise time of the reverse pulse	t_r	=	0,6 ns
	Reverse pulse duration	t_p	=	100 ns
Oscilloscope:	Rise time	t_r	=	0,35 ns

* I_R = 3 mA.

Circuit capacitance C ⩽ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

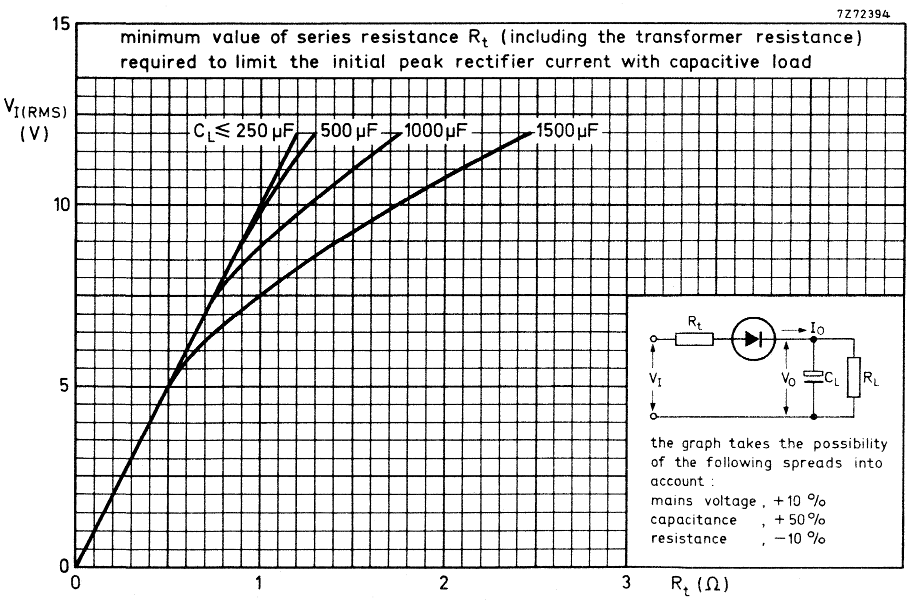


Fig. 5.

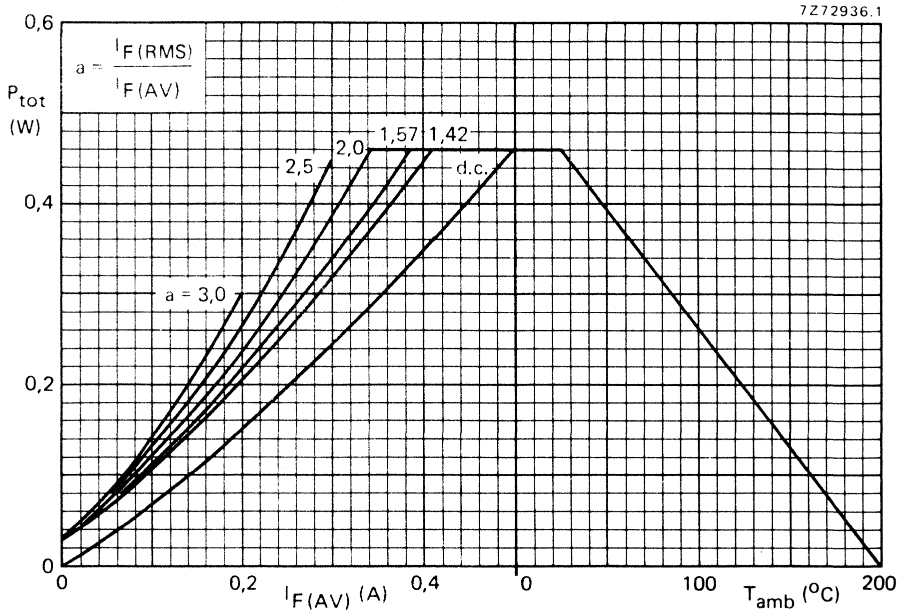


Fig. 6.

From the left-hand graph the total power dissipation can be found as a function of the average output current

The parameter $a = \frac{I_{F(RMS)} \text{ per diode}}{I_{F(AV)} \text{ per diode}}$ depends on $n\omega R_L C_L$ and $\frac{R_t + r_{diff}}{nR_L}$ and can be found from existing graphs.

For detailed explanation see Application Book: RECTIFIER DIODES.

Once the power dissipation is known, the maximum permissible ambient temperature follows from the right-hand graph.
For the series resistance, added to limit the initial peak rectifier current, the required minimum value can be found from Fig. 5.
The value of r_{diff} can be found from Fig. 9.

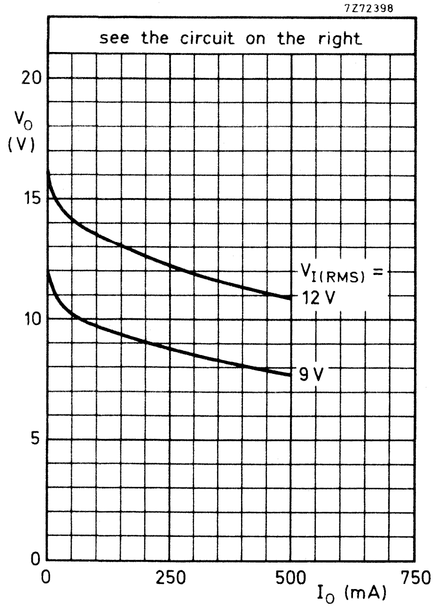


Fig. 7.

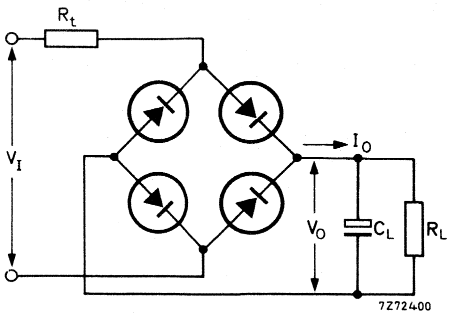


Fig. 8 Test circuit.

V_I (V)	R_t (Ω)	C_L (μF)
12	1,7	1000
9	1,1	1000

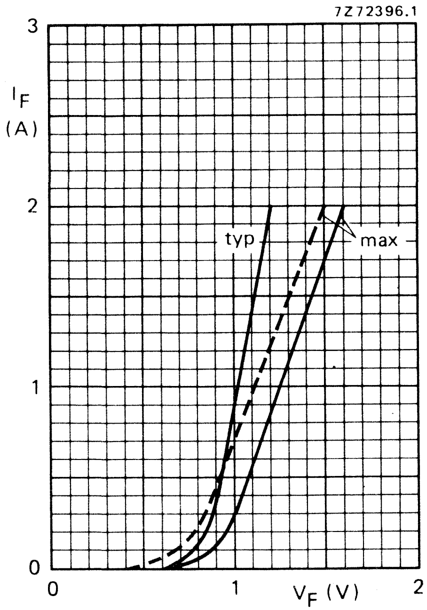


Fig. 9 Forward voltage as a function of the forward current.
—— T_j = 25 °C; – – – T_j = 150 °C.

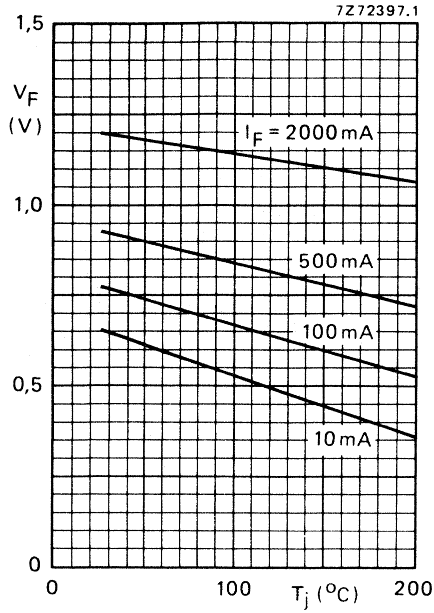


Fig. 10 Typical values forward voltage as a function of junction temperature.

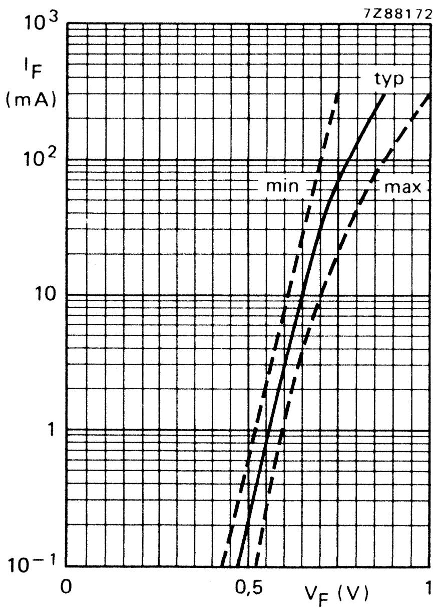


Fig. 11 Forward voltage as a function of the forward current. T_j = 25 °C.

GENERAL PURPOSE DIODE

General purpose diode in a DO-35 in envelope primarily intended for rectifier applications

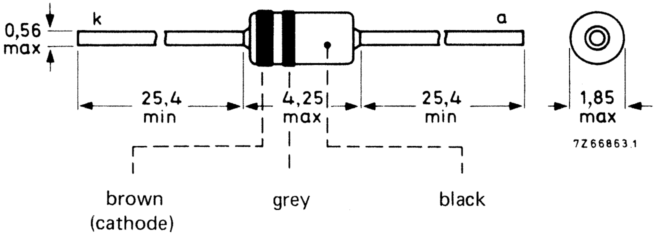
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Average forward current	$I_{F(AV)}$	max.	400	mA
Non-repetitive peak forward current	I_{FSM}	max.	6,0	A

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



RATINGS

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

Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Continuous reverse voltage	V_R	max.	75	V
Forward current (d.c.)	I_F	max.	500	mA
Average forward current (averaged over any 20 ms period) see Fig. 2	$I_{F(AV)}$	max.	400	mA
Repetitive peak forward current	I_{FRM}	max.	2,0	A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) T_j = 25 °C prior to surge	I_{FSM}	max.	6,0	A
Storage temperature	T_{stg}	−65 to +	200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air

at maximum lead strength	$R_{th\ j\text{-}a}$	=	0,38	K/mW
at T_{lead} = 25 °C at 8 mm from the body	$R_{th\ j\text{-}a}$	=	0,30	K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage I_F = 2 A; T_j = 150 °C	V_F	<	1500	mV
Reverse current V_R = 75 V; T_j = 150 °C	I_R	<	100	µA
Diode capacitance V_R = 0; f = 1 MHz	C_d	typ. <	20 35	pF pF

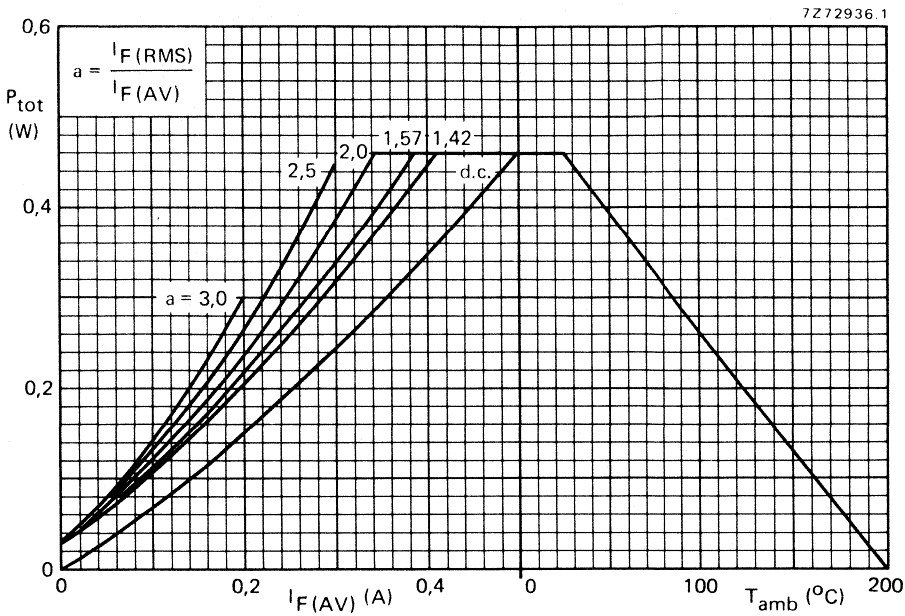


Fig. 2.

From the left-hand graph the total power dissipation can be found as a function of the average output current

The parameter $a = \frac{I_{F(RMS)} \text{ per diode}}{I_{F(AV)} \text{ per diode}}$ depends on $n\omega R_L C_L$ and $\frac{R_t + r_{diff}}{nR_L}$ and can be found from existing graphs.

For detailed explanation see Application Book: RECTIFIER DIODES.

Once the power dissipation is known, the maximum permissible ambient temperature follows from the right-hand graph.
For the series resistance, added to limit the initial peak rectifier current, the required minimum value can be found from Fig. 3.
The value of r_{diff} can be found from Fig. 6.

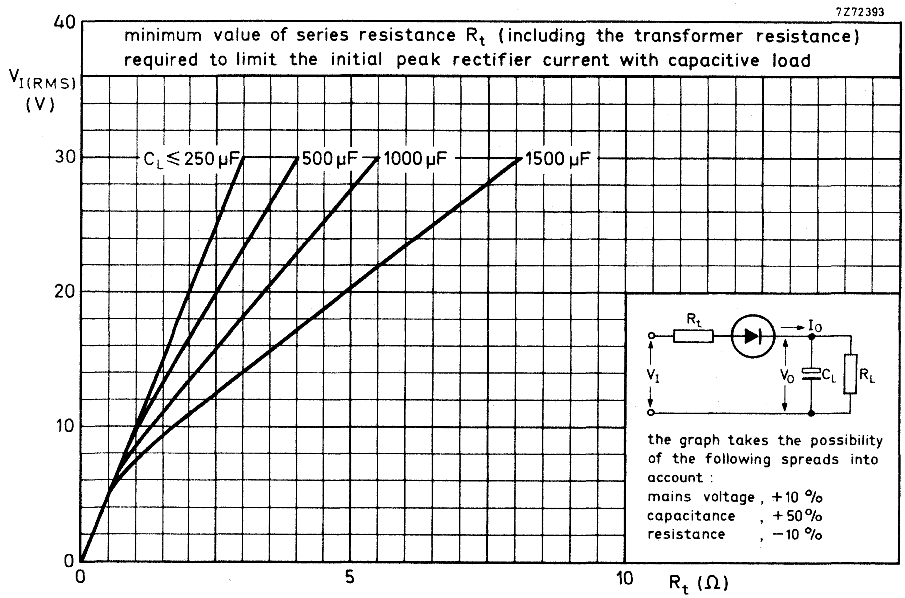


Fig. 3.

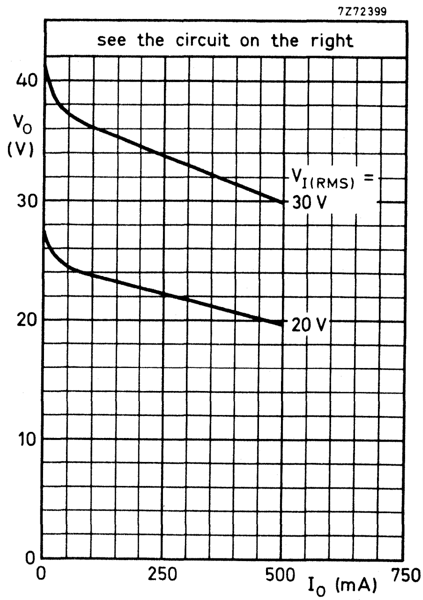


Fig. 4 Output voltages.

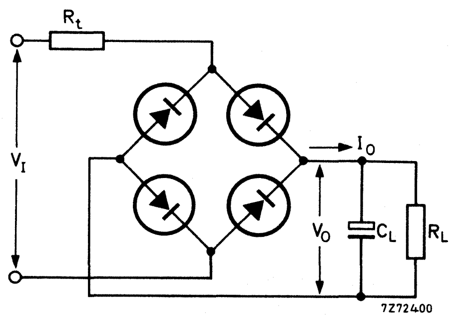


Fig. 5 Test circuit.

V_I (V)	R_t (Ω)	C_L (μF)
30	5,6	1000
20	3,4	1000

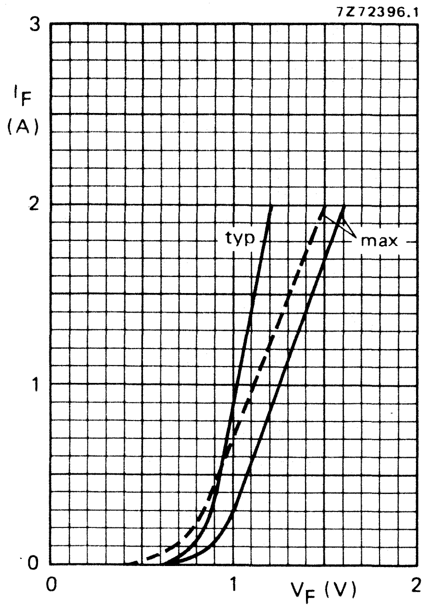


Fig. 6 Typical and maximum values forward current as a function of the forward voltage.
——— T_j = 25 °C; – – – – T_j = 150 °C.

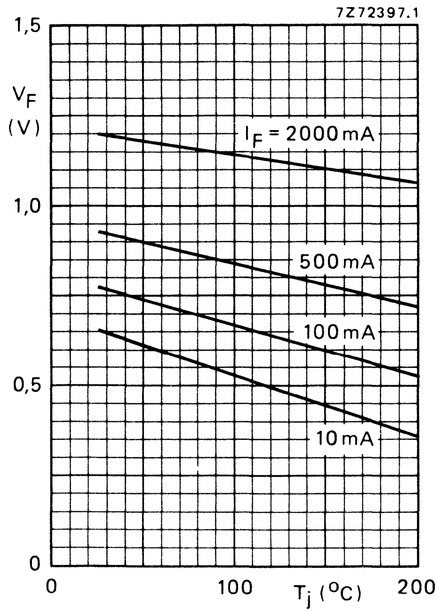


Fig. 7 Typical values forward voltage as a function of junction temperature.

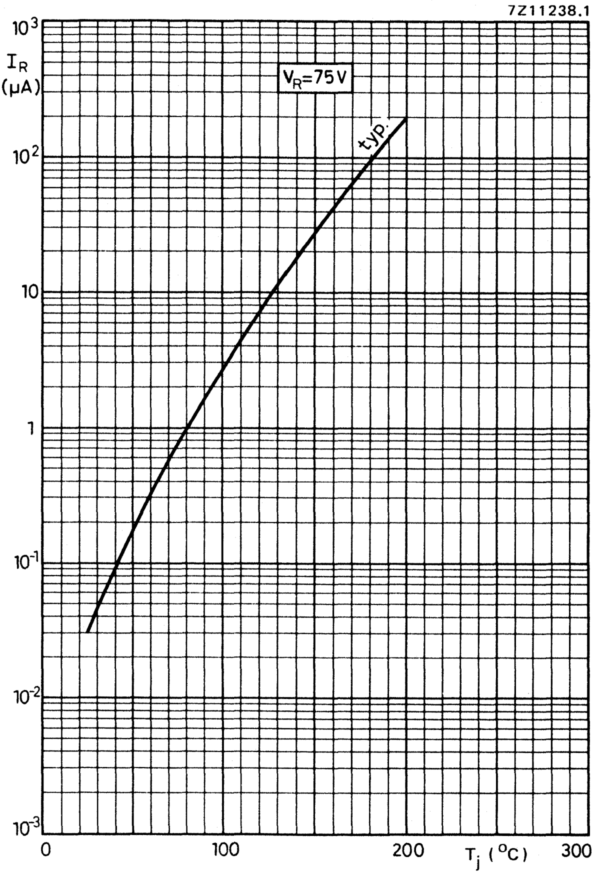


Fig. 8 Typical value reverse current as a function of junction temperature.

GENERAL PURPOSE DIODE

Silicon planar epitaxial diode in DO-35 envelope; intended for switching and general purposes in industrial equipment e.g. oscilloscopes, digital voltmeters and video output stages in colour television.

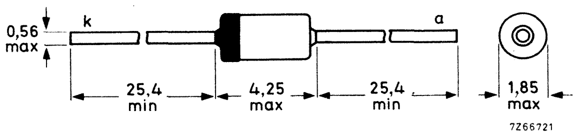
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	120 V
Forward current (d.c.)	I_F	max.	250 mA
Junction temperature	T_j	max.	175 °C
Forward voltage I_F = 100 mA	V_F	<	1,0 V
Reverse current V_R = 120 V	I_R	<	100 nA
Diode capacitance V_R = 0; f = 1 MHz	C_d	<	6 pF
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R = 3 mA	t_{rr}	<	50 ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35



The cathode is indicated by a coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	120	V
Repetitive peak reverse voltage	V_{RRM}	max.	150	V
Forward current (d.c.)	I_F	max.	250	mA
Average rectified forward current	$I_{F(AV)}$	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	625	mA
Non-repetitive peak forward current $t < 1$ s; $T_j = 25$ °C	I_{FSM}	max.	1	A
Total power dissipation up to $T_{amb} = 25$ °C	P_{tot}	max.	400	mW
Storage temperature	T_{stg}	−65	to + 175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,375	K/mW

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

Forward voltage				
$I_F = 0,1$ mA	V_F	0,45 to	0,55	V
$I_F = 10$ mA	V_F	0,65 to	0,80	V
$I_F = 50$ mA	V_F	0,73 to	0,92	V
$I_F = 100$ mA	V_F	0,78 to	1,0	V
$I_F = 150$ mA	V_F	<	1,07	V
Reverse breakdown voltage* $I_R = 100$ µA	$V_{(BR)R}$	>	150	V
Reverse current				
$V_R = 120$ V	I_R	<	100	nA
$V_R = 120$ V, $T_j = 150$ °C	I_R	<	100	µA
Reverse recovery time when switched from $I_F = 30$ mA to $I_R = 30$ mA; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA	t_{rr}	<	50	ns
Diode capacitance $V_R = 0$; f = 1 MHz	C_d	<	6	pF

* At zero lifetime, measured under pulse conditions to avoid excessive dissipation and voltage limited at 275 V.

SILICON PLANAR VARIABLE CAPACITANCE DIODE

The BB112 is a single 9 V variable capacitance diode in a plastic encapsulation for application in tuning circuits in a.m. receivers. The diodes are supplied in matched sets of three items.

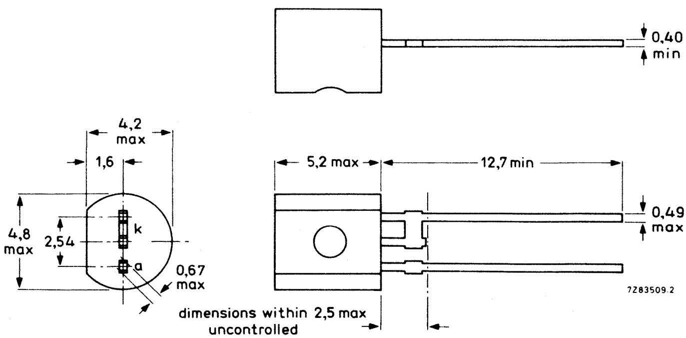
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	12	V
Operating junction temperature	T_j	max.	85	°C
Forward current	I_F	max.	50	mA
Reverse current at T_{amb} = 25 °C				
V_R = 12 V	I_R	<	50	nA
Diode capacitance at f = 1 MHz				
V_R = 1 V	C_d		440 to 540	pF
V_R = 8,5 V	C_d		17 to 29	pF
Series resistance at f = 500 kHz				
V_R = 1 V	r_s	<	1,5	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-69



RATINGS

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

Continuous reverse voltage	V_R	max.	12 V
Forward current (d.c.)	I_F	max.	50 mA
Operating junction temperature	T_j	max.	85 °C
Storage temperature	T_{stg}		−55 to + 125 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 12 V	I_R	<	50 nA
V_R = 12 V; T_{amb} = 85 °C	I_R	<	300 nA
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		440 to 540 pF
V_R = 8,5 V	C_d		17 to 29 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 8,5\ V)}$	>	18
Series resistance at f = 500 kHz			
V_R = 1 V	r_s	<	1,5 Ω
Temperature coefficient of the diode capacitance at f = 1 MHz; T_{amb} = −40 to + 85 °C; V_R = 1 V	η	typ.	0,05 %/K

Matching properties

D.C. capacitance ratio for a set of 3 diodes; V_P = 1 to 9 V	ΔC	⩽	3 %

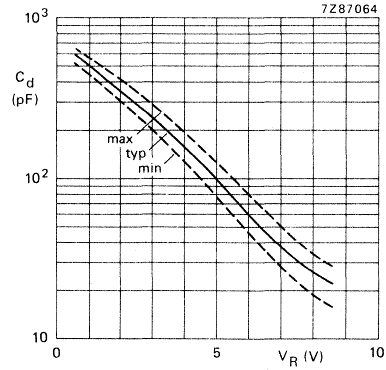


Fig. 2 Diode capacitance at f = 1 MHz as a function of the reverse voltage.

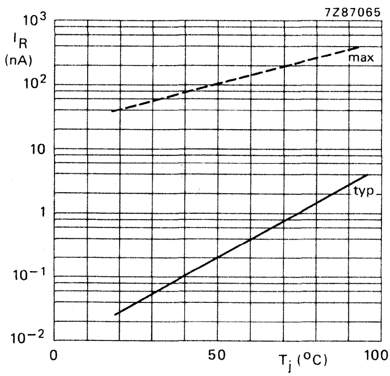


Fig. 3 Reverse current as a function of junction temperature at V_R = 12 V.

SILICON VARIABLE CAPACITANCE DIODE

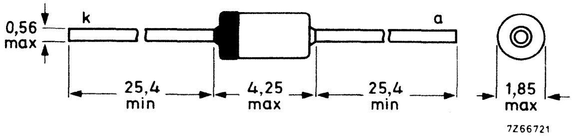
Planar-diffused diode in a DO-35 envelope intended for automatic frequency control in radio and television receivers.

QUICK REFERENCE DATA				
Continuous reverse voltage	V_R	max.	15	V
Junction temperature	T_j	max.	200	°C
Reverse current at V_R = 15 V; T_j = 150 °C	I_R	<	2,0	μA
Diode capacitance at f = 1 MHz V_R = 4 V	C_d		20 to 25	pF
Capacitance ratio at f < 300 MHz	$\frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)}$	≥	1,3	
Series resistance at V_R = 4 V; f = 200 MHz	r_D	<	1,5	Ω

MECHANICAL DATA

Dimensions in mm

DO-35



The coloured band indicates the cathode

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

Voltage

Continuous reverse voltage	V_R	max.	15	V

Current

Forward current (d.c.)	I_F	max.	200	mA

Temperatures

Storage temperature	T_{stg}	-65 to +200		^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

From junction to ambient in free air

CHARACTERISTICS $T_j = 25\ ^oC$ unless otherwise specified

Reverse current

$V_R = 15$ V; $T_j = 150\ ^oC$	I_R	<	2,0	μA

Forward voltage

$I_F = 100$ mA	V_F	<	950	mV

Diode capacitance at f = 1 MHz

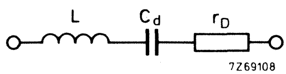
$V_R = 4$ V	C_d	20 to 25		pF

Capacitance ratio at f < 300 MHz $\quad \frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)} \geq 1,3$

Series resistance at f = 200 MHz

$V_R = 4$ V	r_D	typ.	0,9	Ω
		<	1,5	Ω

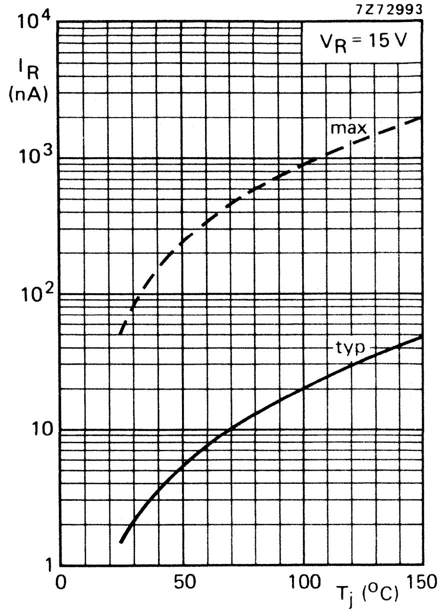
Simplified equivalent circuit:

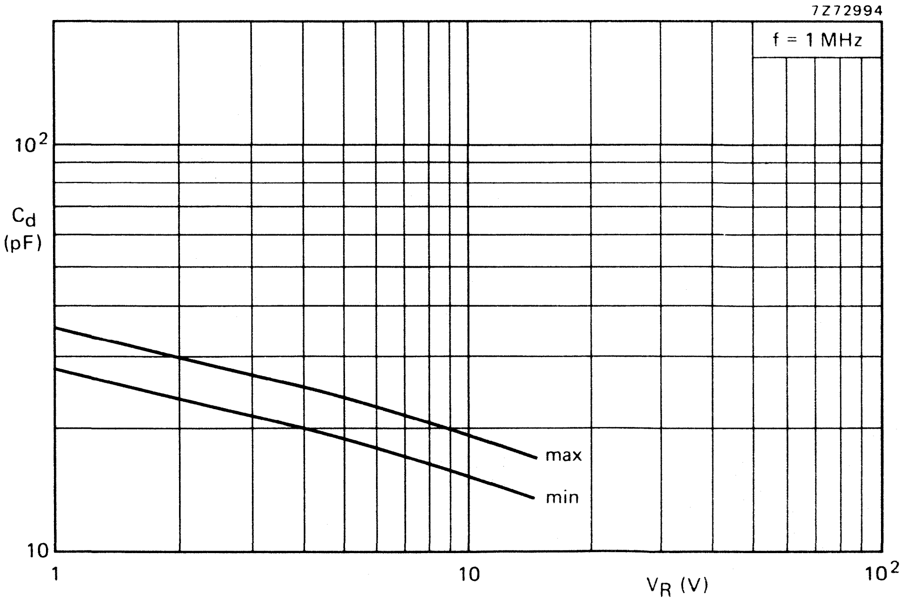


L = lead inductance ≈ 6 nH
r_D = series resistance
C_d = diode capacitance (see page 3)

frequency independent up to f = 300 MHz

These data apply for a distance of 10 mm between the two measuring points.


7Z72993
V_R = 15 V
I_R (nA)
10^4
10^3
10^2
10
1
max
typ
0
50
100
150
T_j (°C)


7Z72994
f = 1 MHz
C_d (pF)
10^2
10
max
min
1
10
10^2
V_R (V)

VARIABLE CAPACITANCE DIODE

A single variable capacitance diode, in a plastic envelope. The diode is for tuning of long, medium and short wavebands. Also suitable for frequency synthesizer applications.

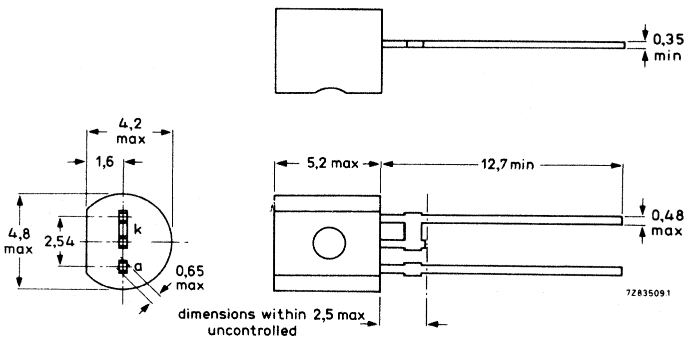
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Reverse current at V_R = 30 V	I_R	<	50	nA
Diode capacitance at f = 1 MHz; V_R = 28 V	C_d		12 to 21	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	>	23	
Series resistance f = 1 MHz; V_R = 1 V	r_s	<	2	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-69 (TO-92 variant).



RATINGS

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

Continuous reverse voltage	V_R	max.	30 V
Reverse voltage (peak value)	V_{RM}	max.	32 V
Forward current (d.c.)	I_F	max.	50 mA
Storage temperature	T_{stg}		−55 to +125 °C
Operation junction temperature	T_j	max.	85 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 30 V	I_R	<	50 nA
V_R = 30 V; T_{amb} = 85 °C	I_R	<	300 nA
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		450 to 550 pF
V_R = 28 V	C_d		12 to 21 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	>	23
Series resistance at f = 1 MHz and V_R = 1 V	r_s	<	2 Ω
Temperature coefficient of the diode capacitance at f = 1 MHz; T_{amb} = −20 °C to +85 °C, V_R = 1 V	η	typ.	0,05 %/°C
Capacitance matching			
Relative capacitance difference between two diodes at V_R = 1 to 28 V	$\frac{\Delta C}{C}$	<	3 %

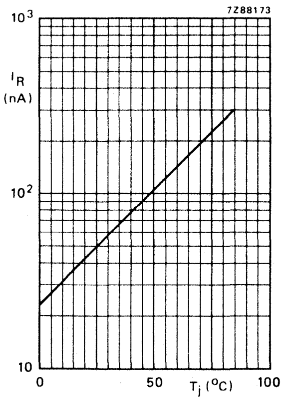


Fig. 2 Maximum values. Reverse current as a function of the junction temperature. V_R = 30 V.

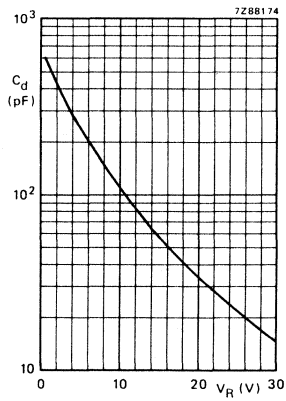


Fig. 3 Typical diode capacitance as a function of reverse voltage; f = 1 MHz.

SILICON PLANAR
VARIABLE CAPACITANCE DOUBLE DIODES

The BB204B and BB204G are double diodes with common cathode in a plastic TO-92 variant, primarily intended for electronic tuning in band II (f.m.). They are recommended for stages where large signals occur (e.g. oscillator circuits).

QUICK REFERENCE DATA

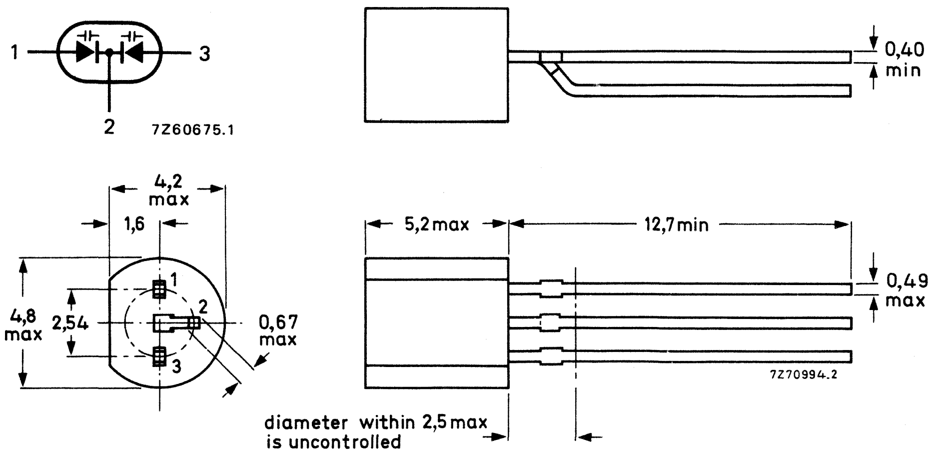
For each diode:

Continuous reverse voltage	V_R	max.		30	V
Junction temperature	T_j	max.		100	^oC
Reverse current at V_R = 30 V	I_R	<		50	nA
			BB204G	BB204B	
Diode capacitance at f = 1 MHz					
V_R = 3 V	C_d		34 – 39	37 – 42	pF
V_R = 8 V	C_d		22 – 27	24 – 29	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 30\ V)}$		2,5 to 2,8		
Series resistance at f = 100 MHz, V_R is that value at which C_d = 38 pF	r_D	typ.		0,2	Ω
		<		0,4	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-92 variant.



RATINGS

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

For each diode:

Continuous reverse voltage	V_R	max.	30 V
Forward current (d.c.)	I_F	max.	100 mA
Storage temperature	T_{stg}		−55 to +100 °C
Junction temperature	T_j	max.	100 °C

CHARACTERISTICS

For each diode:

$T_j = 25\ ^oC$

			BB204G	BB204B	
Reverse current at $V_R = 30$ V	I_R	<		50	nA
Diode capacitance at f = 1 MHz			BB204G	BB204B	
$V_R = 3$ V	C_d		34 – 39	37 – 42	pF
$V_R = 8$ V	C_d		22 – 27	24 – 29	pF
$V_R = 30$ V	C_d	typ.	14 (both)		pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 30\ V)}$		2,5 to 2,8		
Series resistance at f = 100 MHz; V_R is that value at which $C_d = 38$ pF	r_D	typ.	0,2		Ω
		<	0,4		Ω

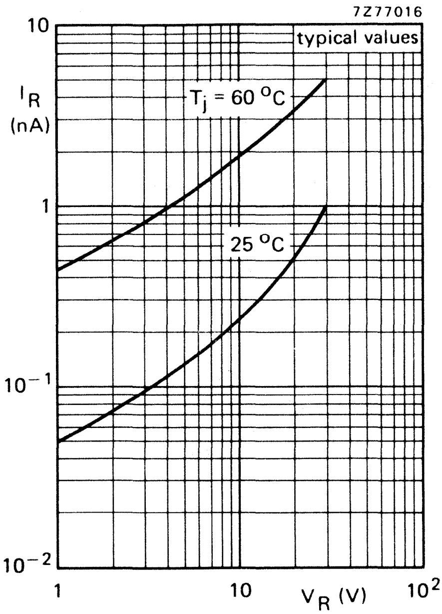

7Z77016
typical values
I_R (nA)
10
1
10^{-1}
10^{-2}
T_j = 60 °C
25 °C
1
10
V_R (V)
10^2

Fig. 2.

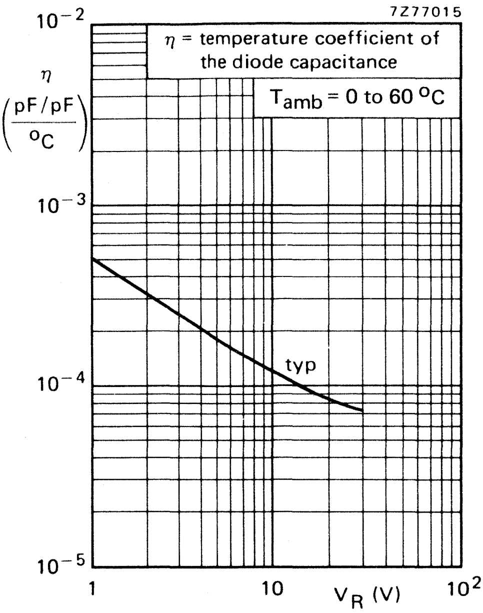

7Z77015
η = temperature coefficient of the diode capacitance
T_{amb} = 0 to 60 °C
η (pF/pF / °C)
10^{-2}
10^{-3}
10^{-4}
10^{-5}
typ
1
10
V_R (V)
10^2

Fig. 3.

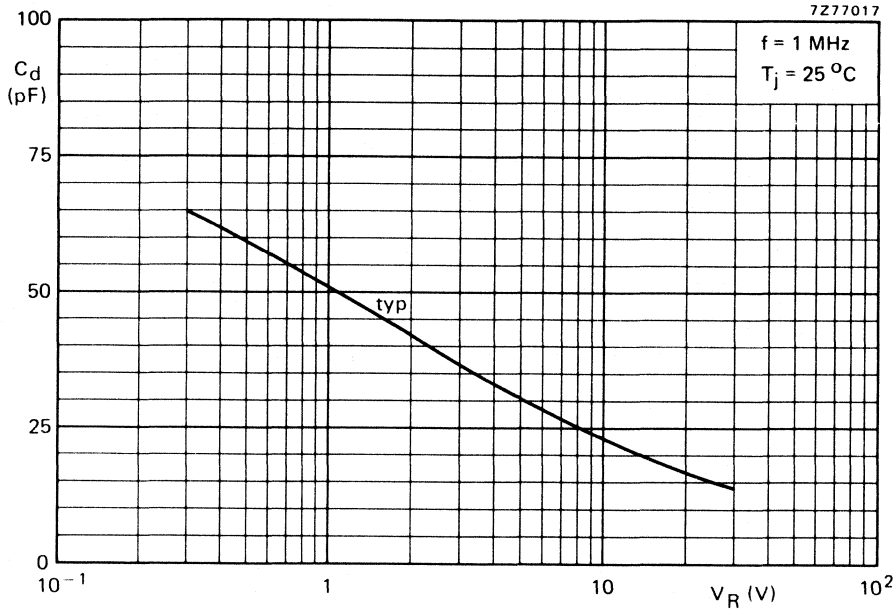

7Z77017
f = 1 MHz
T_j = 25 °C
100
C_d (pF)
75
50
25
0
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 4.

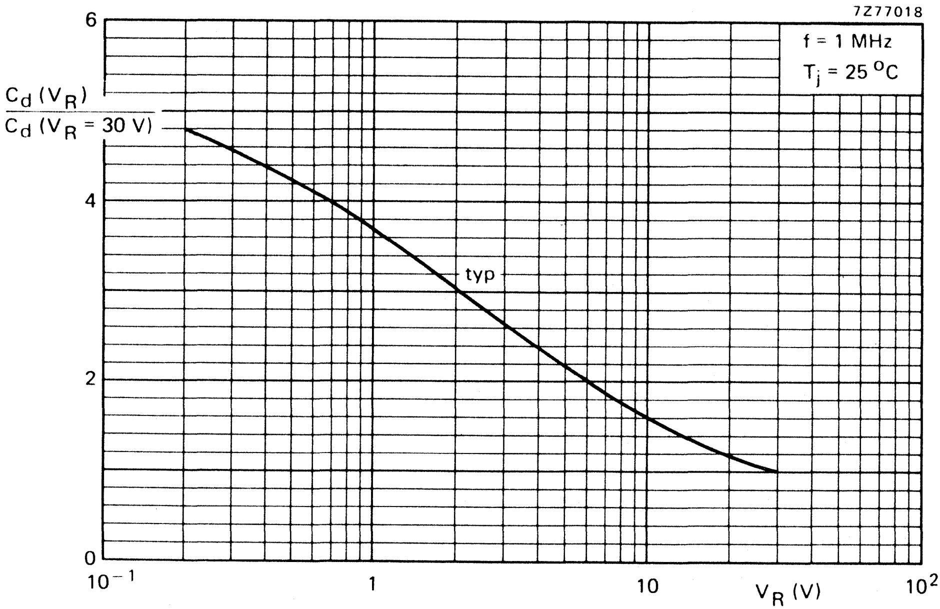

7Z77018
f = 1 MHz
T_j = 25 °C
6
$\frac{C_d(V_R)}{C_d(V_R = 30\ V)}$
4
2
0
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 5.

A.M. VARIABLE CAPACITANCE DOUBLE DIODES

The BB212 is a silicon mesa profiled epitaxial double tuning diode with common cathode in a plastic TO-92 variant.

A special feature is the low tuning voltage which makes the device particularly suited to car and domestic receivers in the L.W., M.W. and S.W. bands.

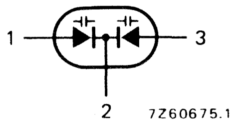
QUICK REFERENCE DATA

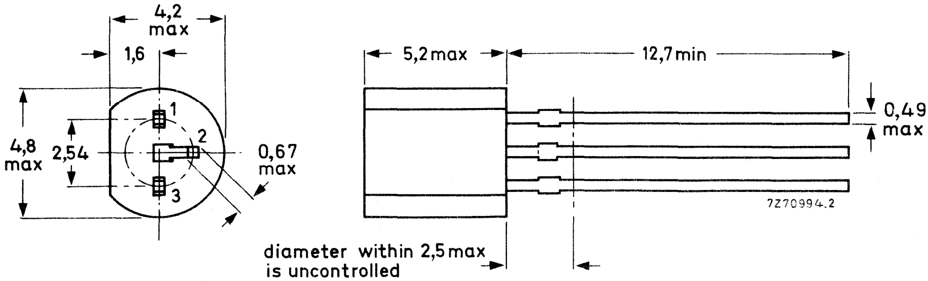
For each diode:				
Continuous reverse voltage	V_R	max.	12	V
Operating junction temperature	T_j	max.	85	^oC
Reverse current at T_j = 25 ^oC				
V_R = 10 V	I_R	<	50	nA
Diode capacitance at f = 1 MHz				
V_R = 0,5 V	C_d		500 to 620	pF
V_R = 8,0 V	C_d	<	22	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0{,}5\ V)}{C_d\ (V_R = 8{,}0\ V)}$	>	22,5	
Series resistance at f = 500 kHz				
V_R is that value at which C_d = 500 pF	r_s	<	2,5	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 TO-92 variant.





The anode of the diode with the higher capacitance C_1 at V_R = 3 V, i.e. a more positive mismatch, is identified by a white dot.

RATINGS (for each diode)

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

Continuous reverse voltage	V_R	max.	12 V
Forward current (d.c.)	I_F	max.	100 mA
Storage temperature	T_{stg}		−55 to + 100 °C
Operating junction temperature	T_j	max.	85 °C

CHARACTERISTICS (for each diode)

T_j = 25 °C unless otherwise specified

Reverse current			
V_R = 10 V	I_R	<	50 nA
V_R = 10 V; T_{amb} = 60 °C	I_R	<	200 nA
Diode capacitance at f = 1 MHz			
V_R = 0,5 V	C_d		500 to 620 pF
V_R = 3,0 V	C_d		140 to 280 pF
V_R = 5,5 V	C_d		40 to 90 pF
V_R = 8,0 V	C_d	<	22 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0{,}5\ V)}{C_d\ (V_R = 8{,}0\ V)}$	>	22,5
Series resistance at f = 500 MHz V_R is that value at which C_d = 500 pF	r_s	<	2,5 Ω
Temperature coefficient of the diode capacitance at f = 1 MHz; T_{amb} = 25 °C to 60 °C			
V_R = 0,5 V	η	typ.	0,054 %/K
V_R = 8,0 V	η	typ.	0,050 %/K

MATCHING PROPERTIES

The capacitance of the two diodes in their common envelope may differ within certain limits. The total, relative capacitance difference between the two diodes in one envelope may be found in Fig. 2. The anode a1 or a2 with the higher capacitance at V_R = 3 V, is identified by a white dot.

BASIC TOLERANCE

The relative deviation of the capacitance value at V_R = 0,5 V is maximum 3,5%.

$$k = \left| \frac{C_1\ (0{,}5\ V) - C_2\ (0{,}5\ V)}{C_2\ (0{,}5\ V)} \right| = < 3{,}5\%.$$

ADDITIONAL TOLERANCE

In the range of V_R = 0,5 to 8 V the following additional tolerances are valid.

→ $$S = \left| \left(\frac{C_1}{C_2}\right)_{V_R} - \left(\frac{C_1}{C_2}\right)_{0{,}5\ V} \right|$$

$S < 2\%$ for V_R = 0,5 to 3 V
$S < 4\%$ for V_R = 3 to 5,5 V
$S < 6\%$ for V_R = 5,5 to 8 V
} see Fig. 2

C_1 is the capacitance of a_1 when $a_1 > a_2$
C_1 is the capacitance of a_2 when $a_2 > a_1$

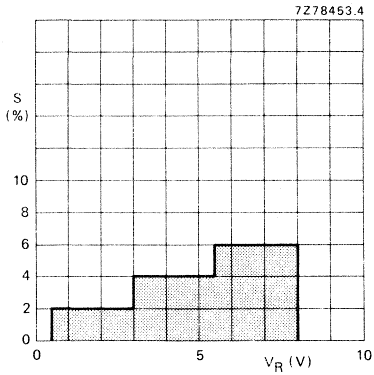


Fig. 2 The shaded area represents the maximum tolerance of the two diodes in one envelope as a function of the reverse voltage.

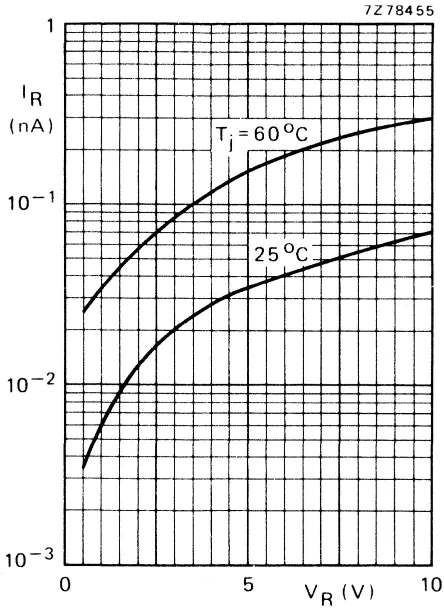


Fig. 3 Typical values.

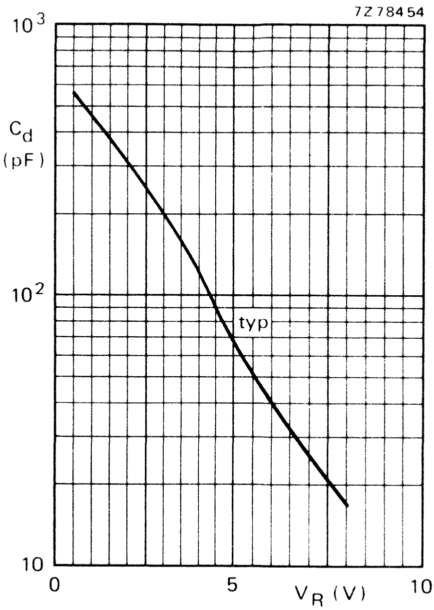


Fig. 4 f = 1 MHz.

U.H.F. VARIABLE CAPACITANCE DIODE

The BB405B is a silicon variable capacitance diode in a hermetically sealed glass envelope and intended for application in u.h.f. tuners.

This miniature diode can be mounted on a 2 E (5,08 mm) pitch.
Diodes are supplied in matched sets and the capacitance difference between any two diodes in one set is less than 3% over the voltage range from 0,5 V to 28 V.

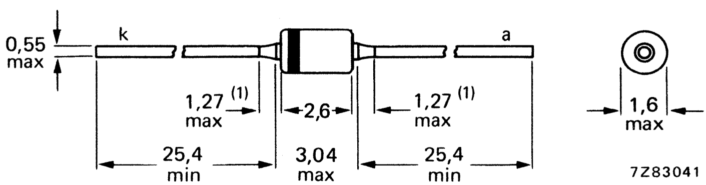
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Reverse current V_R = 28 V	I_R	$<$	10	nA
Diode capacitance at f = 500 kHz V_R = 28 V	C_d		1,8 to 2,2	pF
Capacitance ratio at f = 500 kHz	$\frac{C_d(V_R = 1\ V)}{C_d(V_R = 28\ V)}$	$>$	7,6	
Series resistance at f = 470 MHz V_R is that value at which C_d = 9 pF	r_s	$<$	0,75	Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.
The cathode is indicated by a white band on a black body.

RATINGS

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

Continuous reverse voltage	V_R	max.	30	V
Reverse voltage (peak value)	V_{RM}	max.	30	V
Forward current (d.c.)	I_F	max.	20	mA
Storage temperature	T_{stg}		–55 to +150	°C
Operating junction temperature	T_j	max.	100	°C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current				
V_R = 28 V	I_R	<	10	nA
V_R = 28 V; T_{amb} = 85 °C	I_R	<	100	nA
Diode capacitance at f = 500 kHz*				
V_R = 1 V	C_d	<	18	pF
V_R = 3 V	C_d	typ.	11	pF
V_R = 25 V	C_d		1,8 to 2,2	pF
Capacitance ratio at f = 500 kHz	$\frac{C_d(V_R = 1\ V)}{C_d(V_R = 28\ V)}$	>	7,6	
Series resistance at f = 470 MHz and at that value of V_R at which C_d = 9 pF	r_s	<	0,75	Ω

* Matching: Devices are supplied on a bandolier with a space between matched sets (minimum quantity is 120 pieces per set). Capacitance difference between any two diodes in one set is less than 3% over a voltage range from 0,5 V to 28 V.

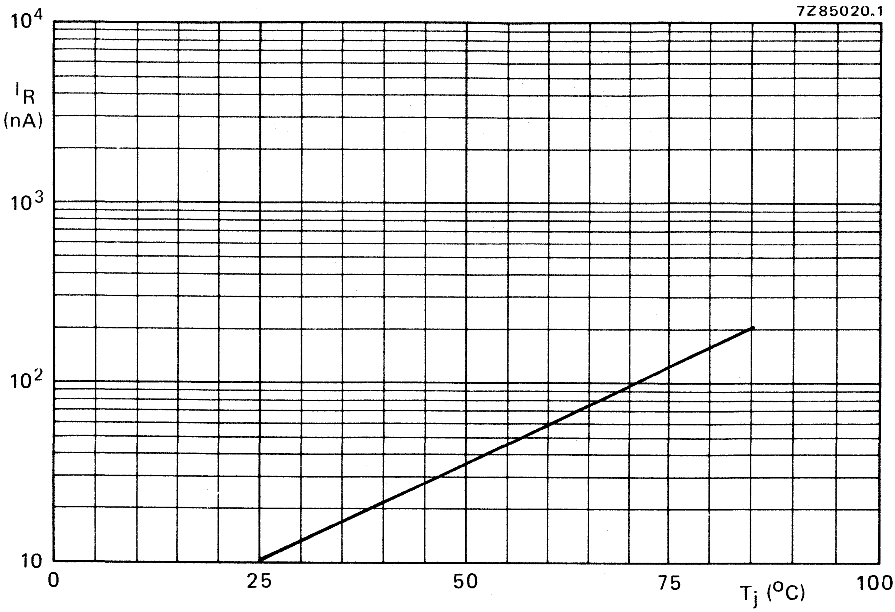


Fig. 2 Maximum values reverse current as a function of the junction temperature. V_R = 28 V.

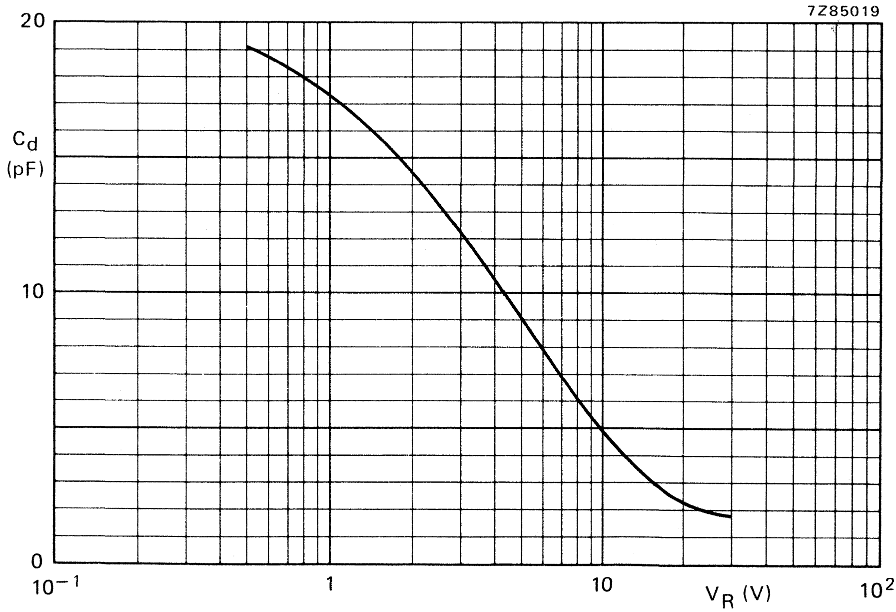


Fig. 3 Maximum values diode capacitance at f = 500 kHz.

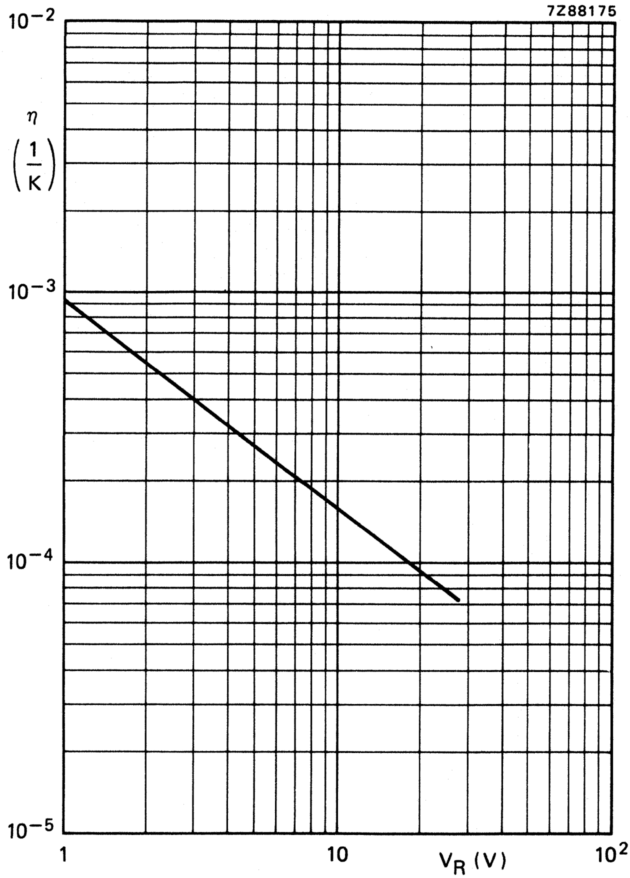


Fig. 4 Maximum values temperature coefficient as a function of reverse voltage. T_j = 0 to 85 °C.

VARIABLE CAPACITANCE DIODE

The BB417 is a silicon variable capacitance diode in a hermetically sealed glass DO-34 envelope. The diode is primarily intended for automatic frequency control in television receivers.

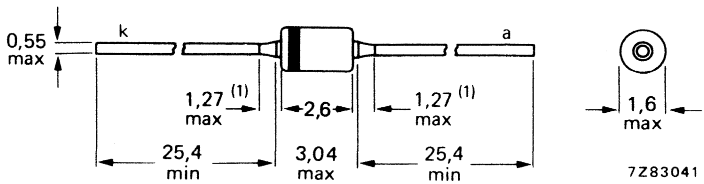
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	20	V
Reverse current at V_R = 20 V	I_R	<	100	nA
Diode capacitance at f = 500 kHz V_R = 15 V	C_d		2,2 to 4,0	pF
Capacitance ratio	$\frac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)}$		2,0 to 5,0	
Series resistance at f = 470 MHz V_R is that value at which C_d = 9 pF	r_D	<	1,2	Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by a white band.

Maximum soldering iron or solder bath temperature 300 °C; maximum soldering time 3 s. Distance from soldering point to seal must be at least 1,5 mm.

RATINGS

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

Continuous reverse voltage	V_R	max.	20 V
Forward current (d.c.)	I_F	max.	20 mA
Storage temperature	T_{stg}	−55 to + 100 °C	
Junction temperature	T_j	max.	100 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Reverse current			
V_R = 20 V	I_R	<	100 nA
V_R = 20 V; T_j = 100 °C	I_R	<	2 mA
Diode capacitance at f = 500 kHz			
V_R = 4 V	C_d		8 to 11 pF
V_R = 15 V	C_d		2,2 to 4,0 pF
Capacitance ratio at f = 500 kHz	$\frac{C_d(V_R = 4\ V)}{C_d(V_R = 15\ V)}$		2,0 to 5,0
Series resistance at f = 470 MHz			
V_R is that value at which C_d = 9 pF	r_D	<	1,2 Ω

SILICON PLANAR VARIABLE CAPACITANCE DIODE

The BB809 is a variable capacitance diode in a miniature glass envelope intended for electronic tuning in v.h.f. television tuners with extended band I (FCC and OIRT-norm).

Diodes are supplied in matched sets (minimum 120 pieces and divisible by 12) and the capacitance difference between any two diodes in one set is less than 3% over the voltage range from 0,5 V to 28 V.

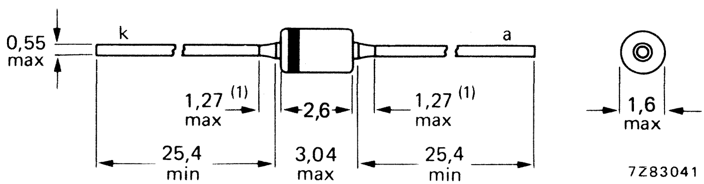
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	28	V
Reverse current at V_R = 28 V	I_R	max.	10	nA
Diode capacitance at f = 500 kHz				
V_R = 1 V	C_d		39 to 46	pF
V_R = 28 V	C_d		4,0 to 5,0	pF
Capacitance ratio at f = 500 kHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		8 to 10	
Series resistance at f = 200 MHz				
V_R is that value at which C_d = 25 pF	r_s	max.	0,6	Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by yellow band.

Maximum soldering iron or solder bath temperature 300 °C; maximum soldering time 3 s. Distance from case is not critical, but the glass envelope must not come into contact with soldering iron.

RATINGS

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

Continuous reverse voltage	V_R	max.	28 V
Reverse voltage (peak value)	V_{RM}	max.	30 V
Forward current (d.c.)	I_F	max.	20 mA
Storage temperature	T_{stg}		−55 to + 150 °C
Operating junction temperature	T_j	max.	100 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,6 K/mW

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 28 V	I_R	⩽	10 nA
V_R = 28 V; T_{amb} = 85 °C	I_R	⩽	200 nA
Diode capacitance at f = 500 kHz			
V_R = 1 V	C_d		39 to 46 pF
V_R = 28 V	C_d		4,0 to 5,0 pF
Capacitance ratio at f = 500 kHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		8 to 10
Series resistance at f = 200 MHz V_R is that value at which C_d = 25 pF	r_s	⩽	0,6 Ω
Relative capacitance difference between two diodes; V_R = 0,5 to 28 V	$\frac{\Delta C}{C}$	⩽	3 %

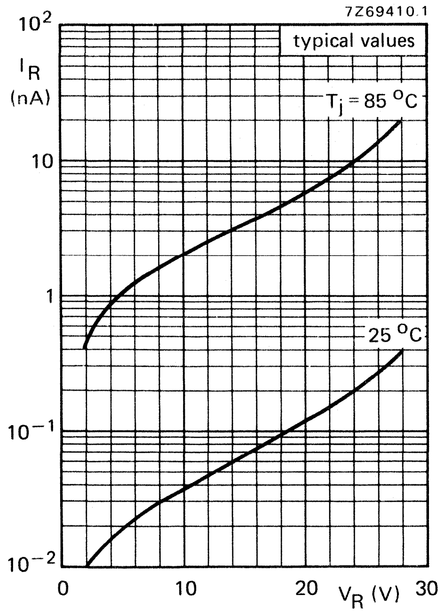


Fig. 2 Typical values.

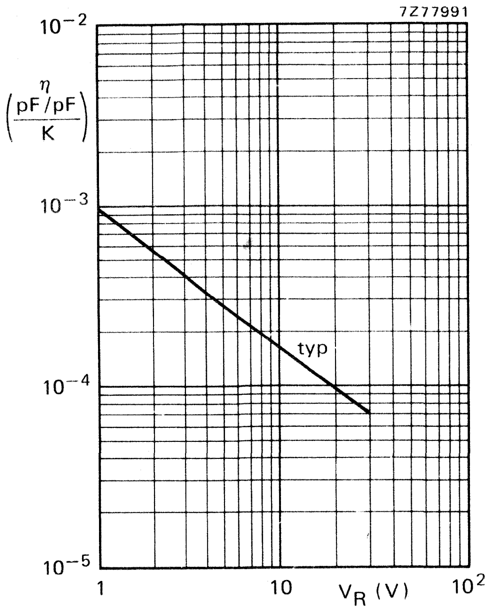


Fig. 3 Temperature coefficient of the diode capacitance; T_{amb} = 0 to 85 °C.

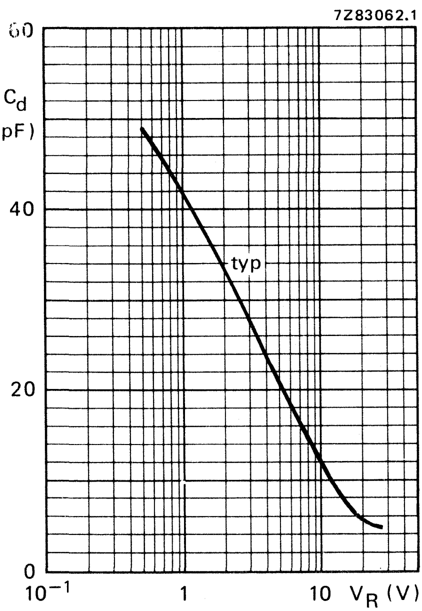


Fig. 4 f = 500 kHz; T_{amb} = 25 °C.

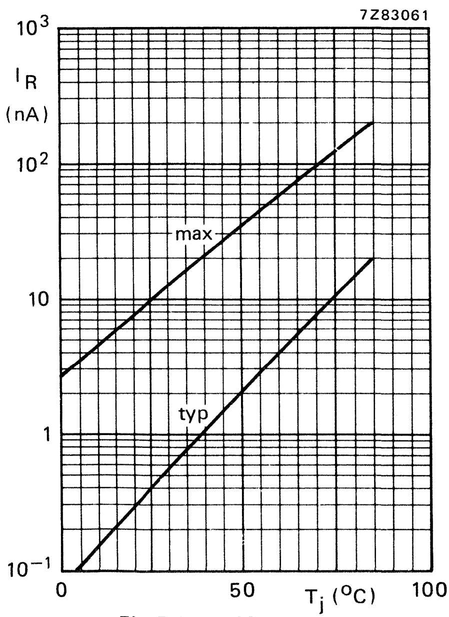


Fig. 5 V_R = 28 V.

SILICON PLANAR VARIABLE CAPACITANCE DIODE

The BB909 is a variable capacitance diode in a glass envelope intended for electronic tuning in v.h.f. television tuners for C.A.T.V. applications.

Diodes are supplied in matched sets (minimum 120 pieces and divisible by 12) and the capacitance difference between any two diodes in one set is less than 2,5% over the voltage range from 1 V to 28 V.

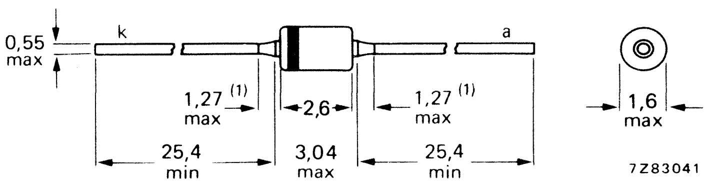
QUICK REFERENCE DATA

Reverse voltage (peak value)	V_{RM}	max.	32 V ←
Reverse current at V_R = 28 V	I_R	<	10 nA
Diode capacitance at f = 1 MHz		BB909A	BB909B
V_R = 1 V	C_d	> 31	33,5 pF
V_R = 28 V	C_d	2,6–3,0	2,8–3,2 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	12–15	
Series resistance at f = 100 MHz, V_R is that value at which C_d = 30 pF	r_s	typ.	0,7 Ω
		<	0,9 Ω

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

BB909B : green cathode ring; body black coloured.
BB909A : additional red band.

RATINGS

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

Reverse voltage (peak value)	V_{RM}	max.	32 V
Forward current (d.c.)	I_F	max.	20 mA
Storage temperature	T_{stg}		−55 to + 150 °C
Operating junction temperature	T_j	max.	100 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\,j\text{-}a}$	=	0,6 K/mW

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current				
V_R = 28 V	I_R	<		10 nA
V_R = 28 V; T_{amb} = 85 °C	I_R	<		200 nA
Diode capacitance at f = 0,5 MHz		BB909A	BB909B	
V_R = 1 V	C_d	> 31	> 33,5	pF
V_R = 3 V	C_d	typ. 23	25	pF
V_R = 28 V	C_d	2,6–3,0	2,8–3,2	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\,(V_R = 1\text{ V})}{C_d\,(V_R = 28\text{ V})}$	12–15		
Series resistance at f = 100 MHz V_R is that value at which C_d = 30 pF	r_s	typ. <		0,7 Ω 0,9 Ω
Tolerance of the capacitance difference between two diodes at V_R = 1 to 28 V	$\frac{\Delta C}{C}$	<		2,5 %

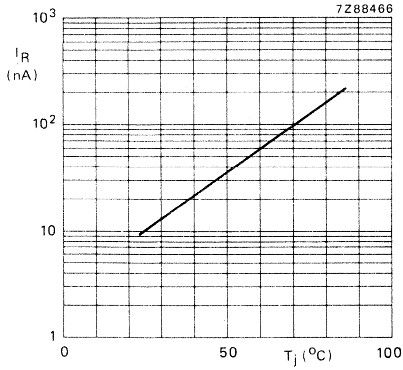


Fig. 2 Reverse current as a function of junction temperature at V_R = 28 V.

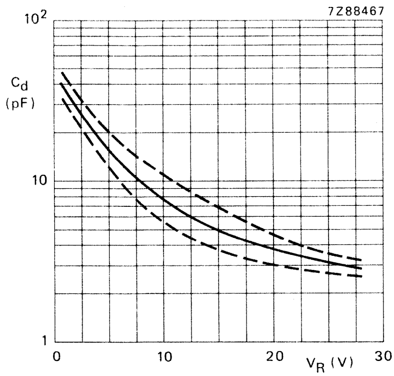


Fig. 3 Diode capacitance as a function of reverse voltage.

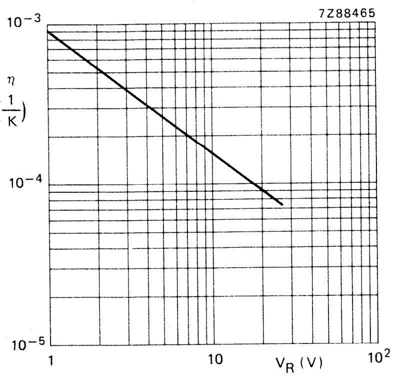


Fig. 4 Temperature coefficient of the diode capacitance as a function of reverse voltage at T_j = 0 to 85 °C.

VARIABLE CAPACITANCE DIODE

Silicon planar variable capacitance diode in a microminiature envelope. It is intended for electronic tuning applications in thick and thin-film circuits.

QUICK REFERENCE DATA

Reverse voltage	V_R	max.	28 V
Reverse current at V_R = 28 V	I_R	<	50 nA
Diode capacitance at f = 1 MHz V_R = 25 V	C_d		1,8 to 2,8 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 25\ V)}$	typ.	5
Series resistance at f = 470 MHz V_R = that value at which C_d = 9 pF	r_D	<	1,2 Ω

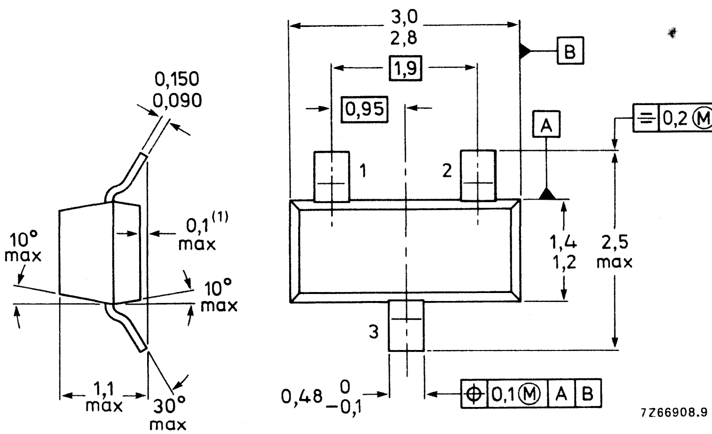
MECHANICAL DATA

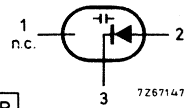
Dimensions in mm

Marking code

BBY31 = S1

Fig. 1 SOT-23.





TOP VIEW

(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations.*

RATINGS

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

Continuous reverse voltage	V_R	max.	28 V
Reverse voltage (peak value)	V_{RM}	max.	30 V
Forward current (d.c.)*	I_F	max.	20 mA
Storage temperature	T_{stg}		−65 to + 100 °C
Operating junction temperature	T_j	max.	85 °C

THERMAL CHARACTERISTICS

$T_j = Px\ (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

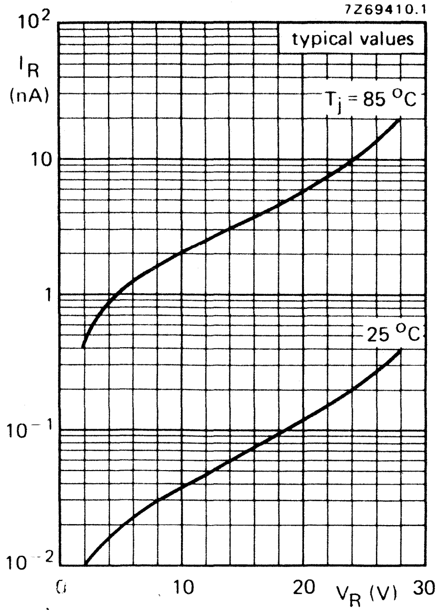
From junction to tab	$R_{th\ j\text{-}t}$	=	60 K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280 K/W
From soldering points to ambient*	$R_{th\ s\text{-}a}$	=	90 K/W

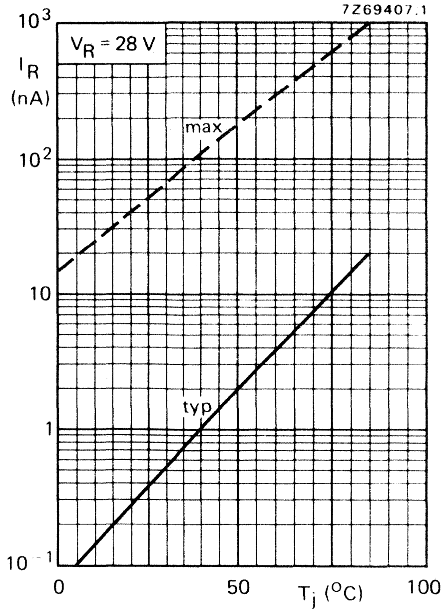
CHARACTERISTICS

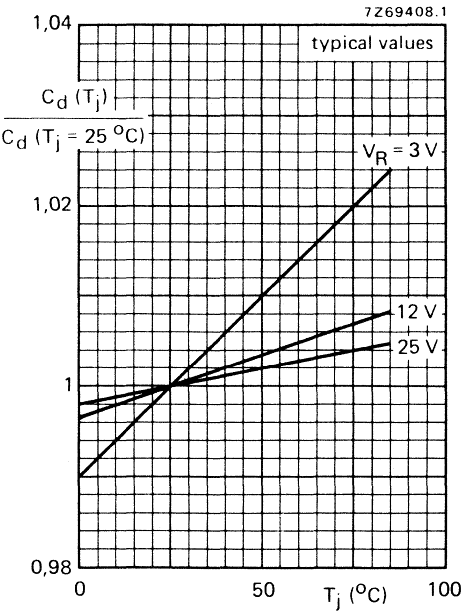
T_j = 25 °C unless otherwise specified

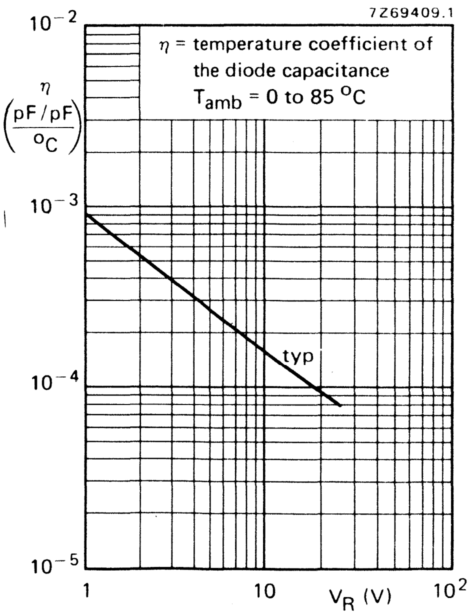
Reverse current			
V_R = 28 V	I_R	<	50 nA
V_R = 28 V; T_j = 85 °C	I_R	<	1000 nA
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d	typ.	17,5 pF
V_R = 3 V	C_d	typ.	11,5 pF
V_R = 25 V	C_d		1,8 to 2,8 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 25\ V)}$	typ.	5
Series resistance at f = 470 MHz and at that value of V_R at which C_d = 9 pF	r_D	<	1,2 Ω

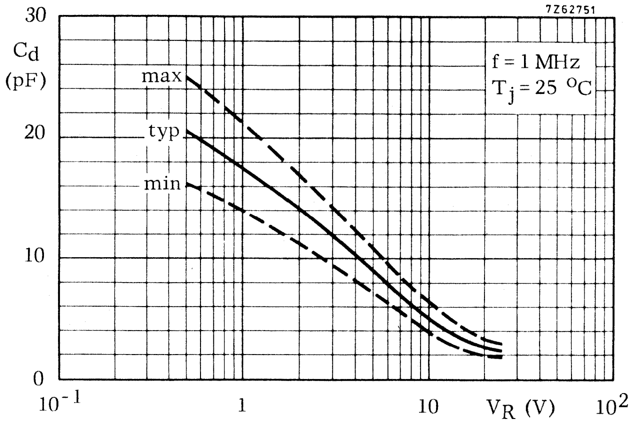
* Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.


7Z69410.1
typical values
I_R (nA)
10^2
10
1
10^{-1}
10^{-2}
T_j = 85 °C
25 °C
0
10
20
30
V_R (V)


7Z69407.1
V_R = 28 V
I_R (nA)
10^3
10^2
10
1
10^{-1}
max
typ
0
50
100
T_j (°C)


7Z69408.1
typical values
$\frac{C_d(T_j)}{C_d(T_j = 25\ ^{\circ}C)}$
1,04
1,02
1
0,98
V_R = 3 V
12 V
25 V
0
50
100
T_j (°C)


7Z69409.1
η = temperature coefficient of
the diode capacitance
T_{amb} = 0 to 85 °C
η $\left(\frac{pF/pF}{^{\circ}C}\right)$
10^{-2}
10^{-3}
10^{-4}
10^{-5}
typ
1
10
10^2
V_R (V)


7Z62751
30
C_d
(pF)
20
10
0
max
typ
min
f = 1 MHz
T_j = 25 °C
10^{-1}
1
10
V_R (V)
10^2

SILICON PLANAR VARIABLE CAPACITANCE DIODE

The BBY40 is a variable capacitance diode in a plastic envelope intended for electronic tuning in v.h.f. television tuners with extended band I (FCC and OIRT-norm).

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	28	V
Reverse current at V_R = 28 V	I_R	<	50	nA
Diode capacitance at f = 1 MHz				
V_R = 3 V	C_d		26 to 32	pF
V_R = 25 V	C_d		4,3 to 6	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 25\ V)}$		5 to 6,5	
Series resistance at f = 200 MHz V_R is that value at which C_d = 25 pF	r_D	<	0,6	Ω

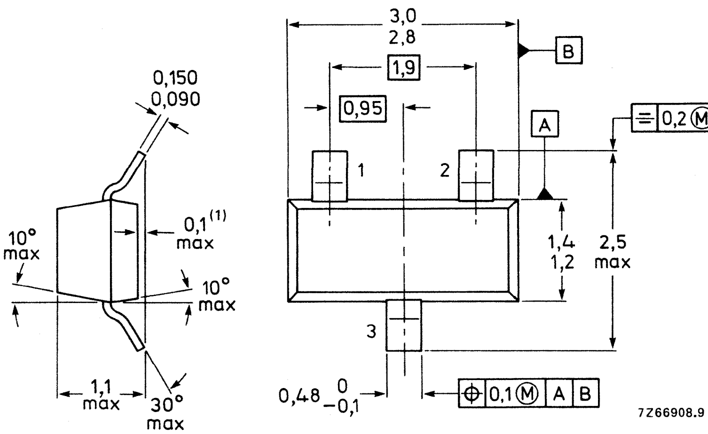
MECHANICAL DATA

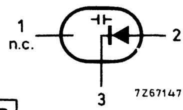
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BBY40 = S2





TOP VIEW

(1) Also available in 0,1 – 0,2 mm version.

See also *Soldering recommendations*.

RATINGS

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

Continuous reverse voltage	V_R	max.	28	V
Reverse voltage (repetitive peak value)	V_{RRM}	max.	30	V
Forward current (d.c.)	I_F	max.	20	mA
Storage temperature	T_{stg}	−55 to + 100		^oC
Operating junction temperature	T_j	max.	85	^oC

THERMAL CHARACTERISTICS

$T_j = Px\ (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	60	K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280	K/W
From soldering points to ambient*	$R_{th\ s\text{-}a}$	=	90	K/W

CHARACTERISTICS

T_{amb} = 25 ^oC unless otherwise specified

Reverse current				
V_R = 28 V	I_R	typ.	0,1	nA
		<	50	nA
V_R = 28 V; T_{amb} = 60 ^oC	I_R	<	500	nA
Diode capacitance at f = 1 MHz				
V_R = 3 V	C_d		26 to 32	pF
V_R = 25 V	C_d		4,3 to 6	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 3\ V)}{C_d\ (V_R = 25\ V)}$		5 to 6,5	
Series resistance at f = 200 MHz				
V_R is that value at which C_d = 25 pF	r_D	typ.	0,4	Ω
		<	0,6	Ω

→ * Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.

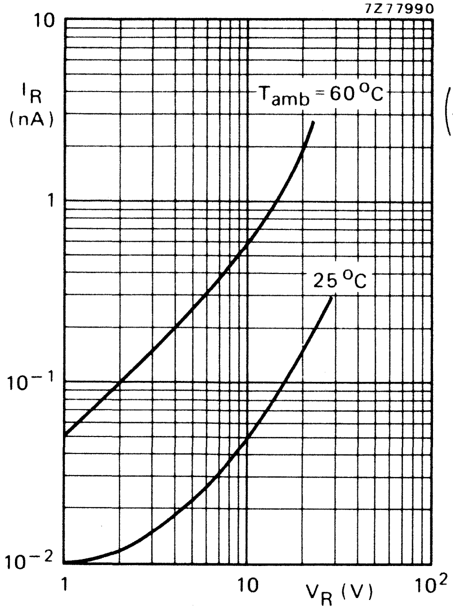


Fig. 2 Typical values

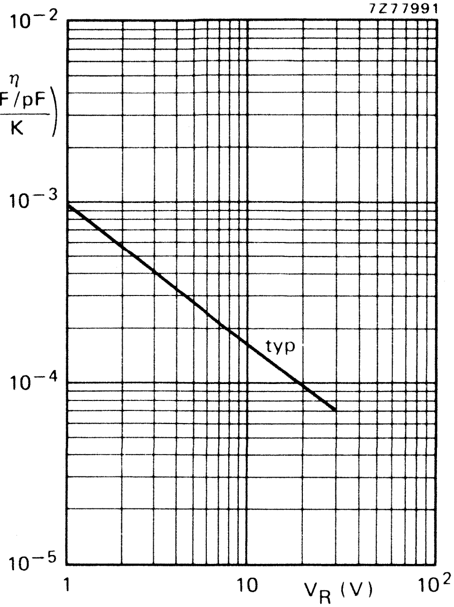


Fig. 3 Temperature coefficient of the diode capacitance; T_{amb} = 0 to 85 °C.

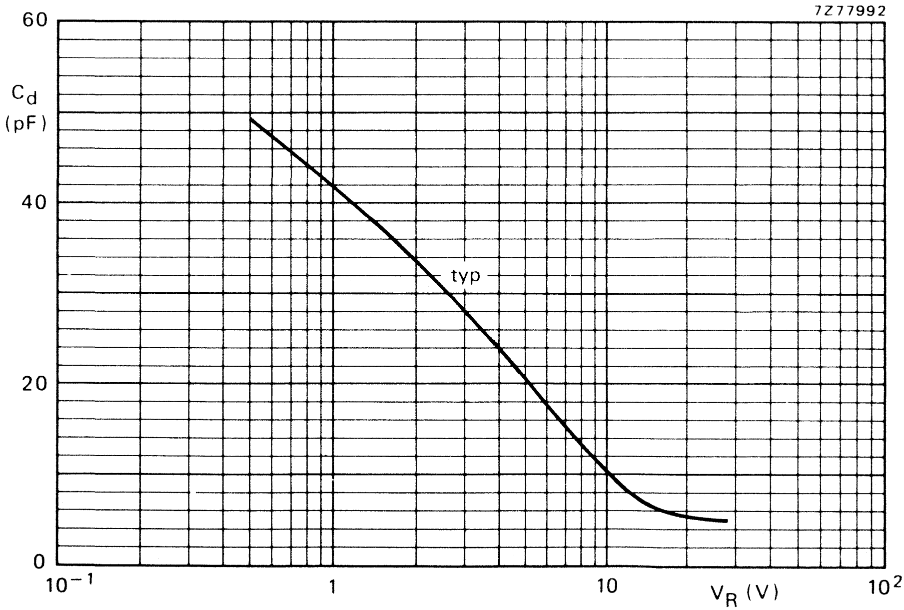


Fig. 4 f = 1 MHz; T_{amb} = 25 °C.

HIGH-VOLTAGE TRIPLER UNITS

Extra-high-tension supply unit in a small housing intended for use in colour television receivers. A protection resistor for the diodes is incorporated in the unit. A sixth diode is to be used as a clamping diode.
The device has a non-flammable encapsulation and is also available with different lead lengths. To enable mounting on a BG 1895 mounting base a mechanical adapter, type number 56397, is available (see 'Accessories').

QUICK REFERENCE DATA

Input voltage (peak-to-peak value)	$V_{i(p-p)}$	max.	10 kV
Output voltage (d.c.) for e.h.t. supply	$V_{O(EHT)}$	max.	27,5 kV
Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	max.	1,7 mA
Output current for focus supply	$I_{O(FOC)}$	max.	400 μA
Main mechanical dimensions			24 mm x 52 mm x 51 mm

MECHANICAL DATA see next page

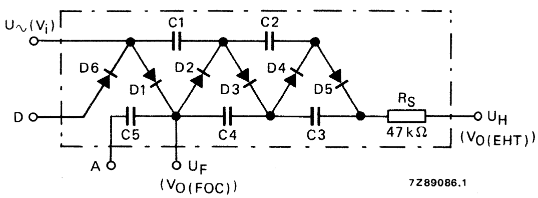
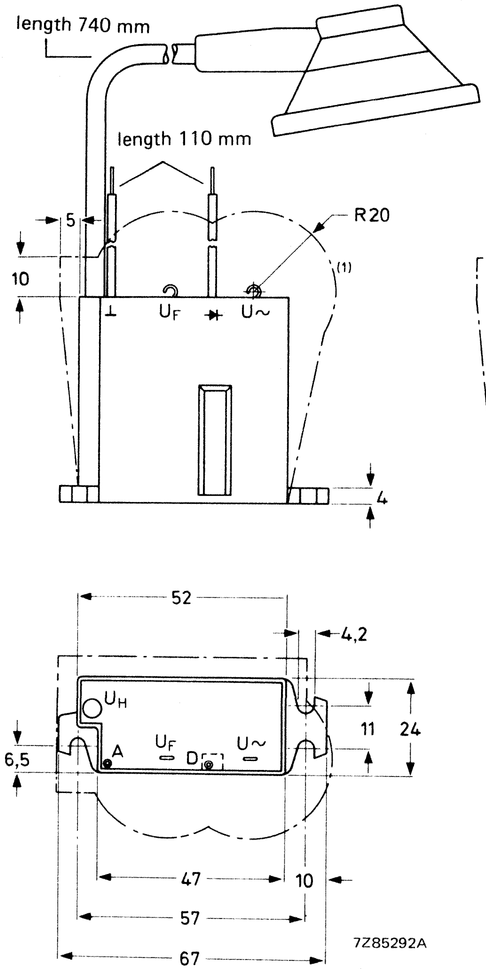


Fig. 1 Circuit diagram.

Dimensions in mm



* Clearance between encapsulation and any other component

Fig. 2 Mechanical data.

The encapsulation is of non-flammable material fulfilling IEC recommendation **65-14.4.** Mounting on a metal chassis is permissible.

Weight: approx. 126 g. Mounting instructions: M4 screw; torque 1,5 Nm (15 kg cm).

RATINGS

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

Voltages

Input voltage (peak-to-peak value)	$V_{i(p\text{-}p)}$	max.	10,0 kV
Output voltage (d.c.)	$V_{OM(EHT)}$	max.	27,5 kV

Currents

Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	max.	1,7 mA
Output current for focus supply	$I_{O(FOC)}$	max.	400 μA
Input current of diode D6	$I_{I(D6)}$	max.	4,0 mA

Temperatures

Storage temperature	T_{stg}	−25 to + 70	°C
Operating ambient temperature	T_{amb}	max.	65 °C

CHARACTERISTICS

T_{amb} = 25 °C

Input voltage (peak-to-peak value) for $V_{O(EHT)}$ = 27,5 V at $I_{(O(EHT)}$ = 1,7 mA; $I_{O(FOC)}$ = 400 μA; $I_{I(D6)}$ = 4 mA	$V_{i(p\text{-}p)}$	≤	9,5 kV
Internal resistance $I_{O(EHT)}$ = 0,1 to 1,5 mA; $V_{i(p\text{-}p)}$ is constant	R_i	typ.	500 kΩ
Input capacitance	C_i	typ.	10 pF

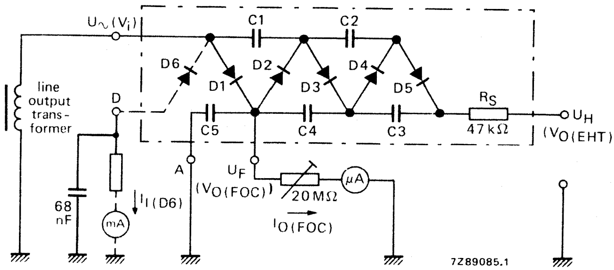


Fig. 3 Test circuit

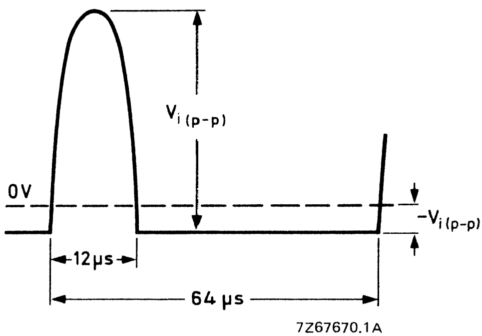


Fig. 4 Input voltage pulse.

EXAMPLE OF OPERATION

$T_{amb} \leq 65\ ^{o}C$; see also Fig. 5

Input voltage (peak-to-peak value)	$V_{i(p-p)}$	8,6	kV
Output voltage (d.c.) for e.h.t. supply	$V_{O(EHT)}$	25	kV
Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	1,5	mA
Output current for focus supply	$I_{O(FOC)}$	300	μA
Input current of diode D6	$I_{I(D6)}$	3,7	mA
Resistor (R) current for V_{G2} voltage divider (see Fig. 5)	$I_{resistor}$	2,0	mA

The resistor (R_s) of 47 kΩ in the tripler is essential for protection of the silicon diodes in the tripler and the output power transistor in the horizontal deflection circuit, it also acts to suppress radiation. Its contribution to the e.h.t. source impedance is negligible.

The diode D6 can be used in conjunction with an RC circuit to clamp negative voltage pulses, and reduce the e.h.t. source impedance during periods of low beam current.

Separate connections for D6 and the capacitor C5 are provided in the interest of flexibility in circuit layout.

APPLICATION INFORMATION

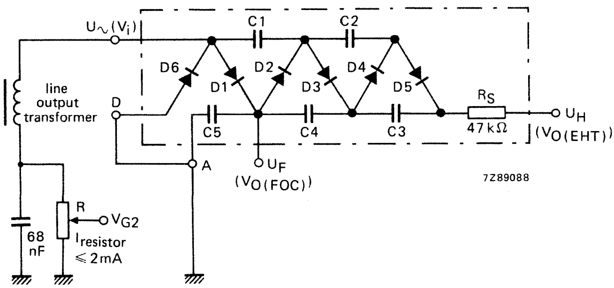


Fig. 5.

HIGH-VOLTAGE TRIPLER UNITS

Extra-high-tension supply unit in a small housing intended for use in colour television receivers. A protection resistor for the diodes is incorporated in the unit. Two versions are available:

BG2097-641 integrated focus resistor in series with the bleeder resistor;
BG2097-642 same as 641 with focus potentiometer.

The devices have non-flammable encapsulations. To enable mounting on a BG1895 mounting base a mechanical adapter, type number 56397, is available (see "Accessories").

QUICK REFERENCE DATA

Input voltage (peak-to-peak value)	$V_{i(p-p)}$	max.	10	kV
Output voltage (d.c.) for e.h.t. supply	$V_{O(EHT)}$	max.	27,5	kV
Focus output voltage range; V_O(EHT) = 25 kV;				
20AX television	$V_{O(FOC)}$		4 to 5,3	kV
30AX television	$V_{O(FOC)}$		6,5 to 7,45	kV
Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	max.	1,7	mA
Current through bleeder resistor	I_{BL}	>	70	μA
Input current of diode D6	$I_{I(D6)}$	<	4	mA
Main dimensions (without focus potentiometer)		24 mm x 80 mm x 51		mm

MECHANICAL DATA see next page

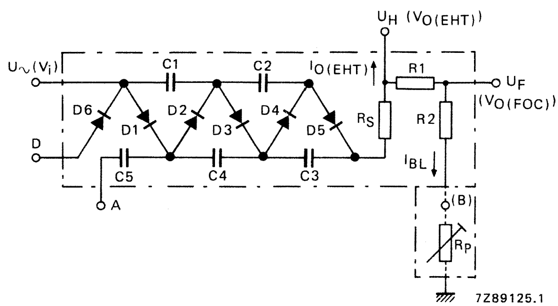
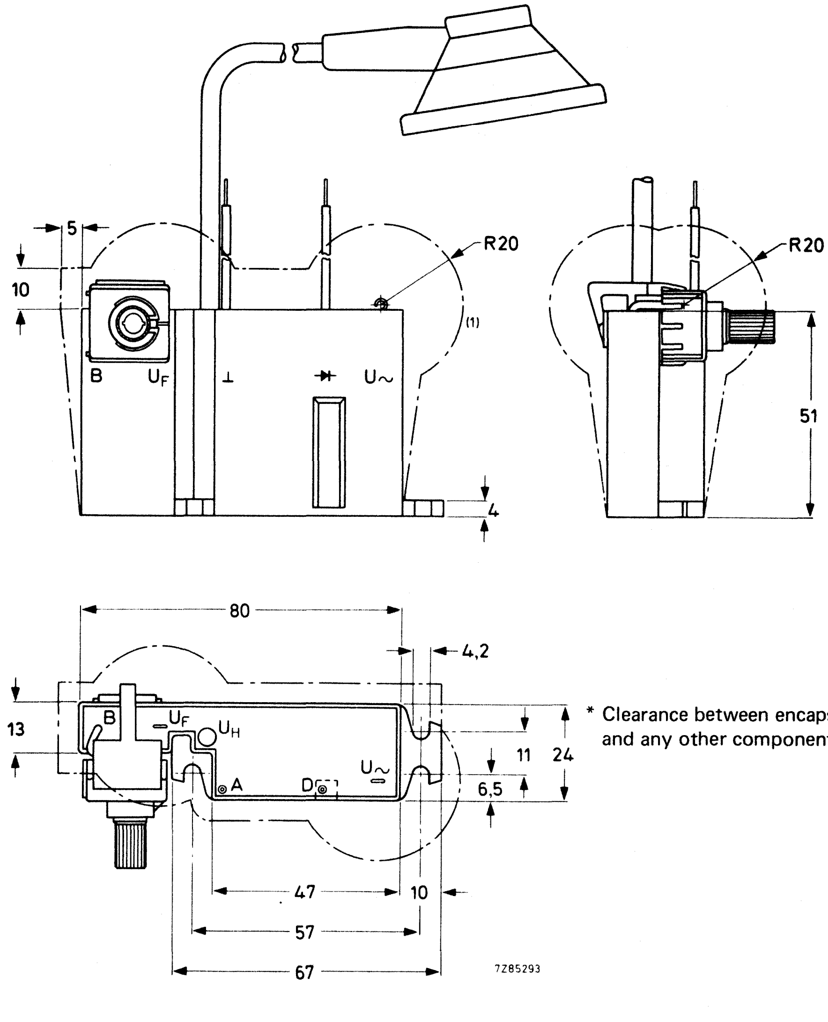


Fig. 1 Circuit diagram.

Dimensions in mm



* Clearance between encapsulation and any other component

Fig. 2 Mechanical data.

The encapsulation is of non-flammable material fulfilling IEC recommendation **65-14.4. Mounting on a** metal chassis is permissible.

Weight: approx. 165 g. Mounting instructions: M4 screw; torque 1,5 Nm (15 kg cm).

RATINGS

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

Input voltage (peak-to-peak value) without load	$V_{i(p-p)}$	max.	10,0	kV ←
Output voltage (d.c.)	$V_{OM(EHT)}$	max.	27,5	kV ←
Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	max.	1,7	mA
Input current of diode D6	$I_{I(D6)}$	max.	4,0	mA
Storage temperature	T_{stg}		−25 to + 70	°C
Operating ambient temperature	T_{amb}	max.	65	°C

CHARACTERISTICS

T_{amb} = 25 °C

Input voltage (peak-to-peak value) for $V_{O(EHT)}$ = 27,5 V at $I_{O(EHT)}$ = 1,7 mA; $I_{I(D6)}$ = 4 mA	$V_{i(p-p)}$	$\leqslant$	9,5	kV
Internal resistance $I_{O(EHT)}$ = 0,1 to 1,5 mA; $V_{i(p-p)}$ is constant	R_i	typ.	500	kΩ
Input capacitance	C_i	typ.	10	pF
Value of focus adjusting potentiometer▲	R_P	typ.	30	MΩ
Adjustable focus output voltage range; $V_{O(EHT)}$ = 25 kV				
20AX television	$V_{O(FOC)}$		4 to 5,3	kV
30AX television	$V_{O(FOC)}$		6,5 to 7,45	kV
Bleeder resistance				
20AX television	R1	typ.	256	MΩ
30AX television*	R1	typ.	221	MΩ
R2 will be accommodated to the adjustment range of $V_{O(FOC)}$				
Current through bleeder resistor; $V_{O(EHT)}$ = 25 kV	I_{BL}	>	70	μA

* Tripler for 30AX television is identified by the first digit of the third group of numbers of the type number e.g. BG2097-641-3. ←

▲ For BG2097-641 an external potentiometer of 30 MΩ ± 15% is necessary to realize the given adjustment range of $V_{O(FOC)}$.

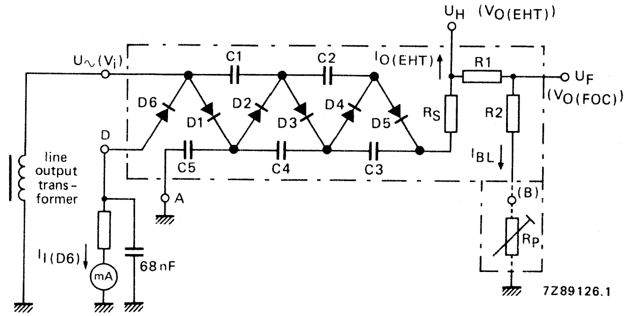


Fig. 3 Test circuit.

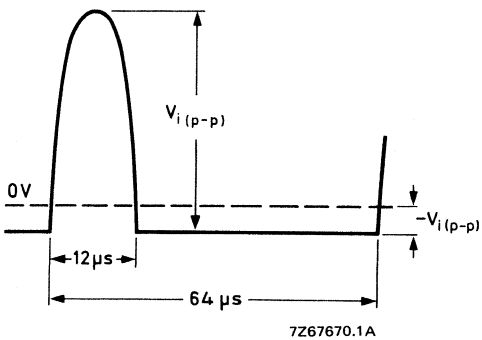


Fig. 4 Input voltage pulse.

EXAMPLE OF OPERATION

$T_{amb} \leq 65\ ^{o}C$

Input voltage (peak-to-peak value)	$V_{i(p-p)}$	typ.	8,6 kV
Output voltage (d.c.) for e.h.t. supply	$V_{O(EHT)}$	typ.	25 kV
Output current (d.c.) for e.h.t. supply	$I_{O(EHT)}$	typ.	1,5 mA
Adjustable focus output voltage range			
20AX	$V_{O(FOC)}$		4,0 to 5,3 kV
30AX	$V_{O(FOC)}$		6,5 to 7,45 kV
Current through bleeder resistance	I_{BL}	typ.	85 μA
Input current of diode D6	$I_{I(D6)}$	typ.	3,7 mA
Resistor (R) current for V_{G2} voltage divider (see Fig. 5)	$I_{resistor}$	typ.	2,0 mA

The resistor (R_S) of 47 kΩ in the tripler is essential for protection of the silicon diodes in the tripler and the output power transistor in the horizontal deflection circuit, it also acts to suppress radiation. Its contribution to the e.h.t. source impedance is negligible.

The diode D6 can be used in conjunction with an RC circuit to clamp negative voltage pulses, and reduce the e.h.t. source impedance during periods of low beam current.

Separate connections for D6 and the capacitor C5 are provided in the interest of flexibility in circuit layout.

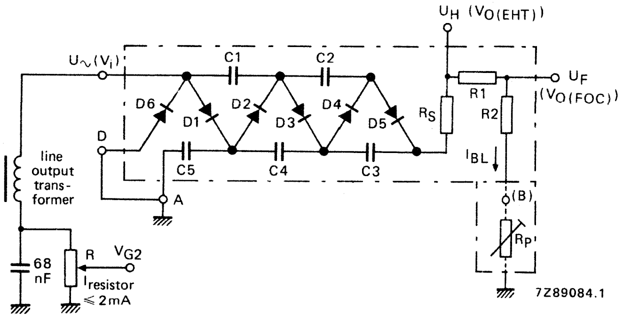


Fig. 5 Example of operation.

PARALLEL EFFICIENCY DIODE

Double-diffused passivated rectifier diode in an hermetically sealed axial-leaded glass envelope, intended for use as efficiency diode in transistorized horizontal deflection circuits of television receivers. The device features high reverse voltage capability with controlled recovery time.

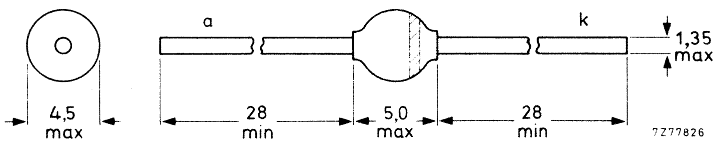
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	1500	V
Working peak forward current	I_{FWM}	max.	5	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Total reverse recovery time	t_{tot}	<	20	μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

Non-repetitive peak reverse voltage during flashover of picture tube	V_{RSM}	max.	1650 V
Repetitive peak reverse voltage	V_{RRM}	max.	1500 V
Working reverse voltage	V_{RW}	max.	1500 V
Working peak forward current	I_{FWM}	max.	5 A
Repetitive peak forward current	I_{FRM}	max.	10 A
Non-repetitive peak forward current t = 10 ms; half sine-wave; T_j = 140 °C prior to surge; with reapplied V_{RWmax}	I_{FSM}	max.	50 A
Storage temperature	T_{stg}		−65 to +175 °C
Junction temperature	T_j	max.	140 °C

THERMAL RESISTANCE

Influence of mounted method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	25 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	75 K/W

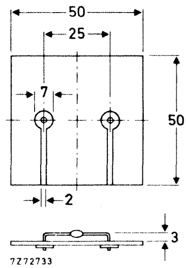


Fig. 2.

CHARACTERISTICS

Forward voltage * I_F = 5 A; T_j = 25 °C	V_F	<	1,5 V*
Reverse current V_R = V_{RWmax}; T_j = 140 °C	I_R	<	200 μA
Total reverse recovery time when switched from I_F = 1 A; $-dI_F/dt$ = 0,05 A/μs; T_j = 140 °C	t_{tot}	<	20 μs
Forward recovery time when switched to I_F = 5 A with t_r = 0,1 μs; T_j = 140 °C	t_{fr}	<	1 μs

* Measured under pulse conditions to avoid excessive dissipation.

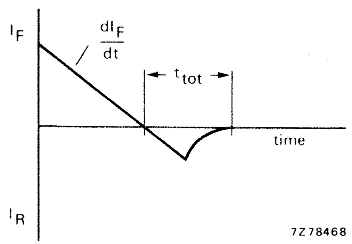


Fig. 3 Definition of t_{tot}.

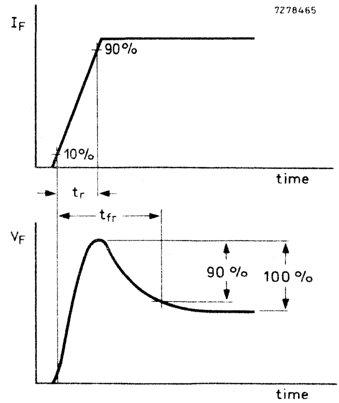


Fig. 4 Definition of t_{fr}.

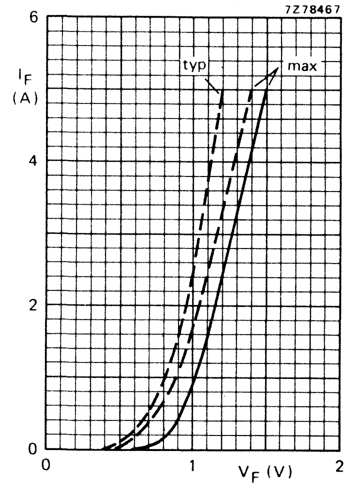


Fig. 5 —— T_j = 25 °C;
– – – T_j = 140 °C.

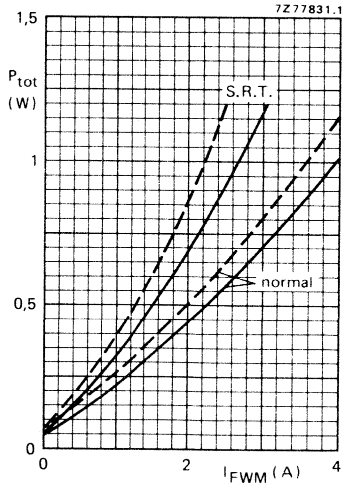


Fig. 6 P_{tot} = power dissipation including switching losses:
– – – – 819 lines; ——— 625 lines;
S.R.T. = self regulating time-base circuit;
normal = conventional deflection circuit or high-voltage E–W modulator circuit;
I_{FWM} is the **nominal** diode current, for tolerances and spreads 25% safety margin is taken into account.

APPLICATION INFORMATION

In designing horizontal deflection circuits, allowance has to be made for component and operating spreads, in order not to exceed any Absolute Maximum Rating.
Extensive analysis have shown that for the working peak forward current and reverse voltage the total allowance need not to be higher than 25%. For that reason the dissipation graph (Fig. 6) is based on the **nominal** I_{FWM}; 25% safety margin for tolerance and spreads is taken into account.

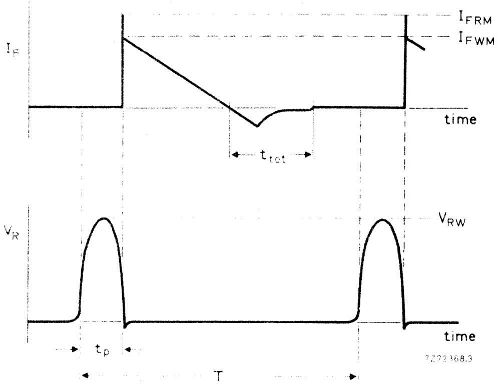


Fig. 7 Basic waveforms.

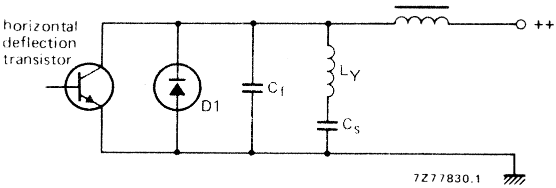


Fig. 8 Basic conventional horizontal deflection circuit. D_1 = BY228.

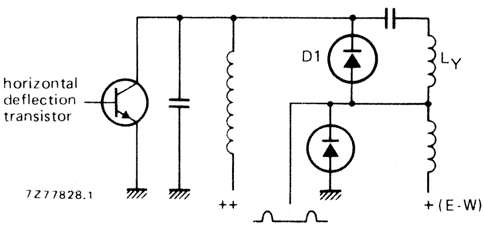


Fig. 9 Basic high-voltage E–W modulator circuit. D_1 = BY228.

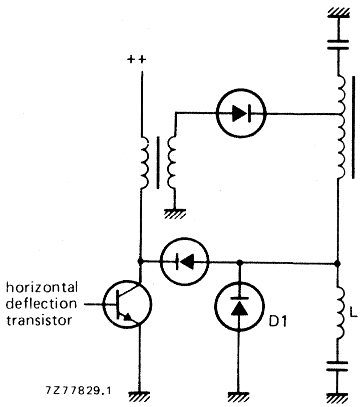


Fig. 10 Basic self-regulating time base circuit (S.R.T.). D_1 = BY228.

PARALLEL EFFICIENCY DIODE

Double-diffused passivated rectifier diode in an hermetically sealed axial-leaded glass envelope, intended for use as efficiency diode in transistorized horizontal deflection circuits of television receivers. The device features high reverse voltage capability with controlled recovery time.

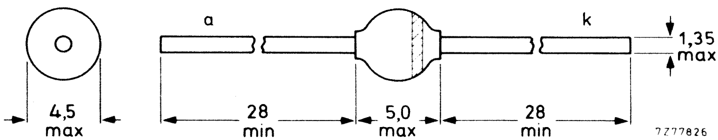
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	1200	V
Working peak forward current	I_{FWM}	max.	5	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Total reverse recovery time	t_{tot}	<	20	μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

Non-repetitive peak reverse voltage during flashover of picture tube	V_{RSM}	max.	1300	V
Repetitive peak reverse voltage	V_{RRM}	max.	1200	V
Working peak forward current	I_{FWM}	max.	5	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current $t = 10$ ms; half sine-wave; $T_j = 140$ °C prior to surge; with reapplied V_{RWmax}	I_{FSM}	max.	50	A
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	140	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	25	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 → (see "Thermal model")	$R_{th\ j\text{-}a}$	=	75	K/W

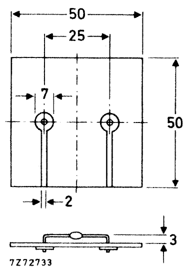


Fig. 2.

CHARACTERISTICS

Forward voltage $I_F = 5$ A; $T_j = 25$ °C	V_F	<	1,5	V*
Reverse current $V_R = V_{RWmax}$; $T_j = 140$ °C	I_R	<	200	μA
Total reverse recovery time when switched from $I_F = 1$ A; $-dI_F/dt = 0{,}05$ A/μs; $T_j = 140$ °C	t_{tot}	<	20	μs
Forward recovery time when switched to $I_F = 5$ A with $t_r = 0{,}1$ μs; $T_j = 140$ °C	t_{fr}	<	1	μs

* Measured under pulse conditions to avoid excessive dissipation.

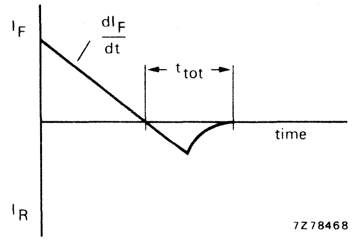


Fig. 3 Definition of t_{tot}.

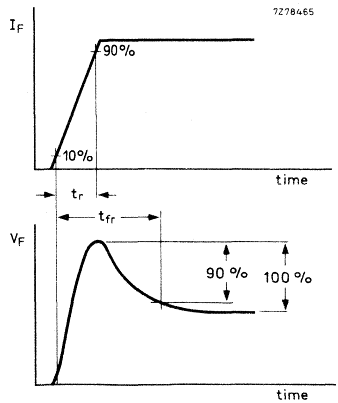


Fig. 4 Definition of t_{fr}.

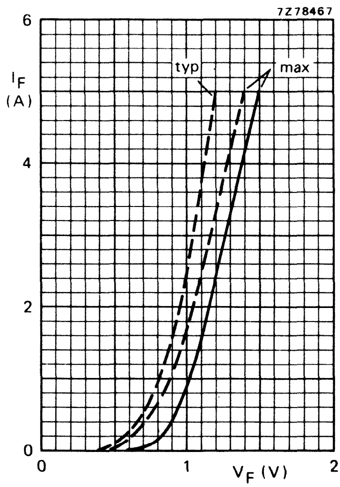


Fig. 5 —— $T_j = 25\,^{\circ}C$; – – – $T_j = 140\,^{\circ}C$.

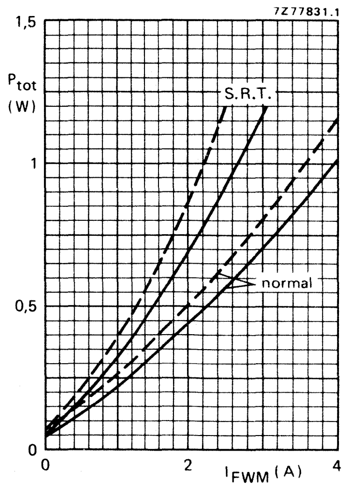


Fig. 6 P_{tot} = power dissipation including switching losses; – – – 819 lines; —— 625 lines; S.R.T. = self regulating time-base circuit; normal = conventional deflection circuit or high-voltage E–W modulator circuit; I_{FWM} is the **nominal** diode current, for tolerances and spreads 25% safety margin is taken into account.

APPLICATION INFORMATION

In designing horizontal deflection circuits, allowance has to be made for component and operating spreads, in order not to exceed any Absolute Maximum Rating.
Extensive analysis have shown that for the working peak forward current and reverse voltage the total allowance need not to be higher than 25%. For that reason **the dissipation graph (Fig. 6) is based on the nominal** I_{FWM}; 25% safety margin for tolerance and spreads is taken into account.

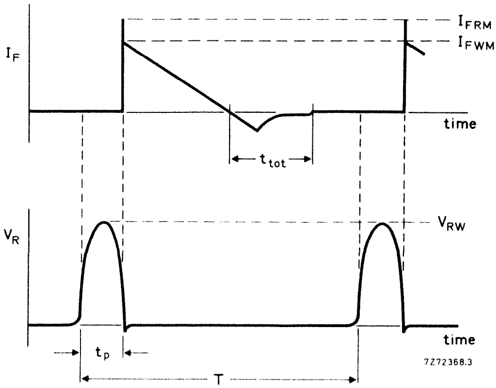


Fig. 7 Basic waveforms.

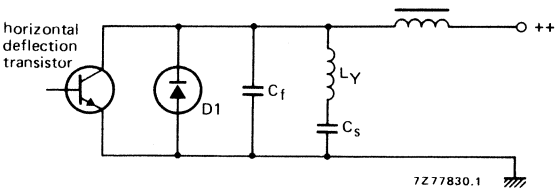


Fig. 8 Basic conventional horizontal deflection circuit. D1 = BY438.

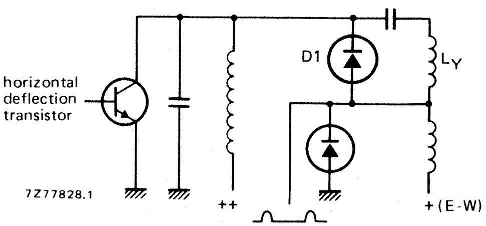


Fig. 9 Basic high-voltage E—W modulator circuit. D1 = BY438.

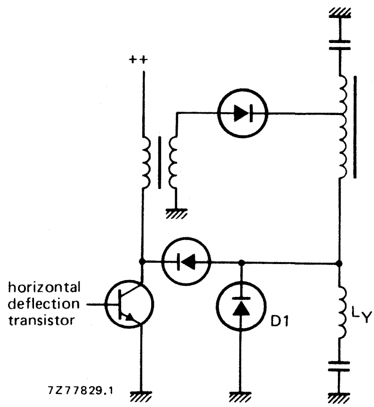


Fig. 10 Basic self-regulating time base circuit (S.R.T.). D1 = BY438.

PARALLEL EFFICIENCY DIODES

Double-diffused passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes, intended for use as efficiency diodes in transistorized horizontal deflection circuits and PPS (power-pack system) circuits of television receivers. The devices feature high reverse voltage capability with controlled recovery time.

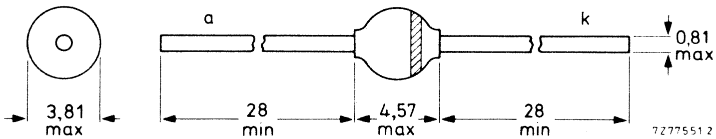
QUICK REFERENCE DATA

			BY458	BY448	
Repetitive peak reverse voltage	V_{RRM}	max.	1200	1500	V
Working peak forward current	I_{FWM}	max.	4		A
Repetitive peak forward current	I_{FRM}	max.	8		A
Total reverse recovery time	t_{tot}	<	20		μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

			BY458	BY448	
Non-repetitive peak reverse voltage during flashover of picture tube	V_{RSM}	max.	1300	1650	V
Repetitive peak reverse voltage	V_{RRM}	max.	1200	1500	V
Working peak forward current	I_{FWM}	max.	4		A
Repetitive peak forward current	I_{FRM}	max.	8		A
Non-repetitive peak forward current t = 10 ms; half sine-wave; T_j = 140 °C prior to surge; with reapplied V_{RRMmax}	I_{FSM}	max.	30		A
Storage temperature	T_{stg}		−65 to +175		°C
Operating junction temperature	T_j	max.	140		°C

THERMAL RESISTANCE

Influence of mounting method (see also OPERATING NOTES and Fig. 11)

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\ j\text{-}tp}$ = 46 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model") — $R_{th\ j\text{-}a}$ = 100 K/W

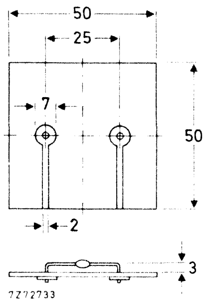


Fig. 2.

MOUNTING AND SOLDERING NOTES

Introduction

Excessive forces or temperatures applied to a diode may cause serious damage to the diode. To avoid damage when soldering and mounting, the following rules have to be followed.

Bending

During bending, the leads must be supported between body and bending point. Axial forces on the body during the bending process must not exceed 50 N. Perpendicular force on the body must be avoided as much as possible, however, if present, it shall not exceed 10 N. Bending the leads through 90° is allowed at any distance from the studs when it is possible to support the leads during the bending without contacting envelope or solder joints.

Twisting

Twisting the leads is allowed at any distance from the body if the lead is properly clamped between stud and twisting point. Without clamping, twisting is allowed only at a distance $>$ 5 mm from the studs, the torque-angle must not exceed 30°.

Soldering

The minimum distance of soldering point to stud is 2 mm, the maximum allowed solder temperature is 300 °C, and the soldering time must not be longer than 10 seconds.

Prevent fast cooling after soldering.

When the device has to be mounted with straight or short-cropped leads, the leads should be soldered individually; bent leads may be soldered simultaneously. Do not correct the position of an already soldered device by pushing, pulling or twisting the body.

CHARACTERISTICS

Forward voltage			
$I_F = 3$ A; $T_j = 25$ °C	V_F	$<$	1,6 V*
Reverse current			
$V_R = V_{RRMmax}$; $T_j = 140$ °C	I_R	$<$	200 μA
Total reverse recovery time when switched from			
$I_F = 1$ A; $-dI_F/dt = 0{,}05$ A/μs; $T_j = 140$ °C	t_{tot}	$<$	20 μs

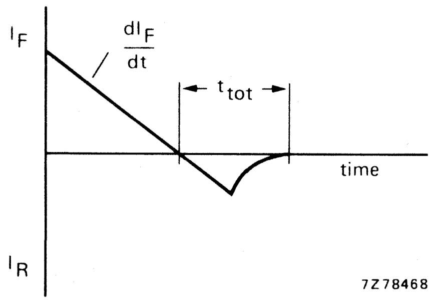


Fig. 3 Definition of t_{tot}.

* Measured under pulse conditions to avoid excessive dissipation.

CHARACTERISTICS (continued)

Forward recovery time when switched to I_F = 4 A with t_r = 0,1 μs; T_j = 140 °C	t_{fr}	<	1 μs

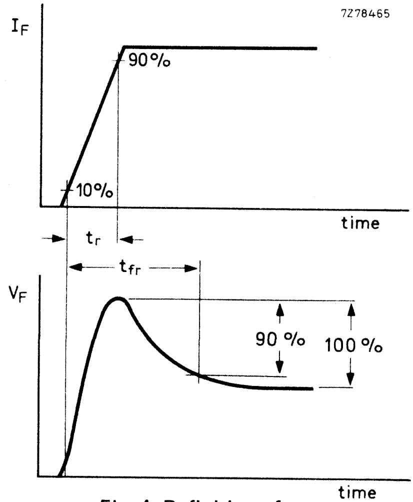


Fig. 4 Definition of t_{fr}.

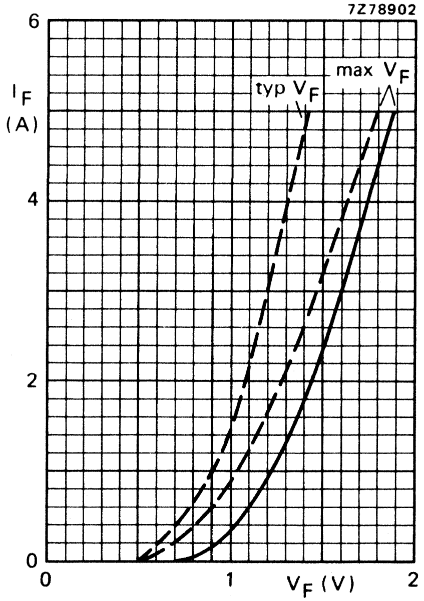


Fig. 5 —— T_j = 25 °C; – – – T_j = 140 °C.

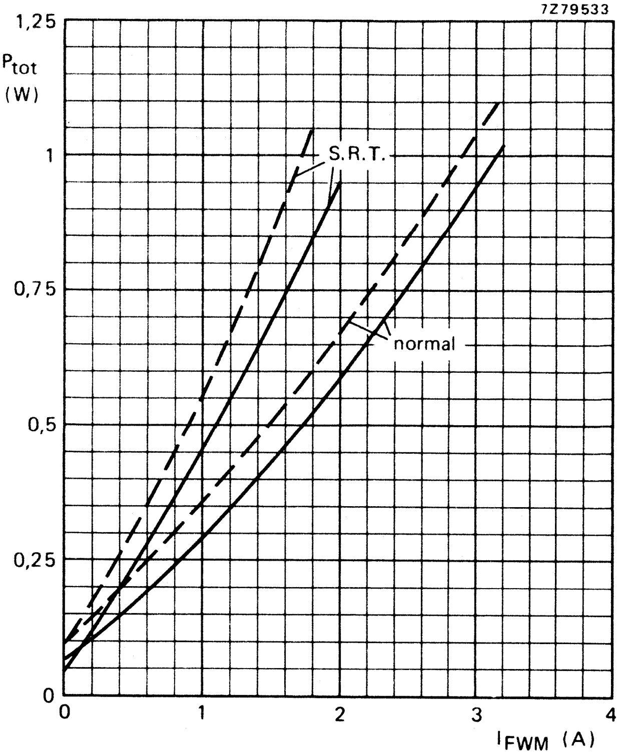


Fig. 6 P_{tot} = maximum power dissipation including switching losses; – – – 819 lines; —— 625 lines; S.R.T. = self regulating time-base circuit; normal = conventional deflection circuit or high-voltage E-W modulator circuit; I_{FWM} = **the nominal** peak diode current, for tolerances and spreads 25% safety margin is taken into account.

APPLICATION INFORMATION

In designing horizontal deflection circuits, allowance has to be made for component and operating spreads, in order not to exceed any Absolute Maximum Rating.
Extensive analysis have shown that for the working peak forward current and reverse voltage the total allowance need not to be higher than 25%. For that reason the dissipation graph (Fig. **6**) is based on the **nominal** I_{FWM}; 25% safety margin for tolerance and spreads is taken into account.

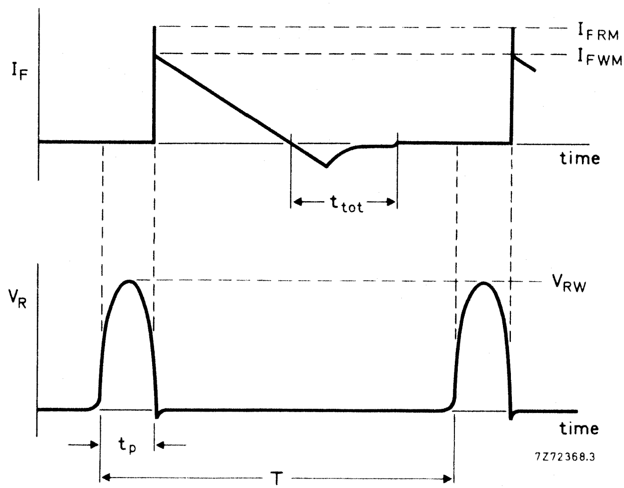


Fig. **7** Basic waveforms.

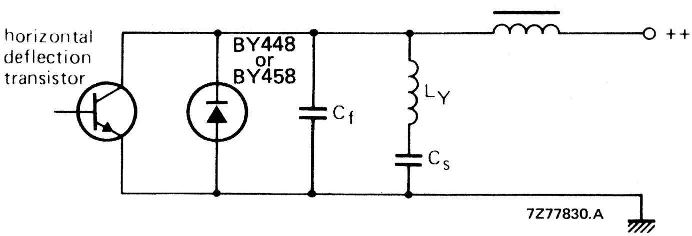


Fig. **8** Basic conventional horizontal deflection circuit.

APPLICATION INFORMATION (continued)

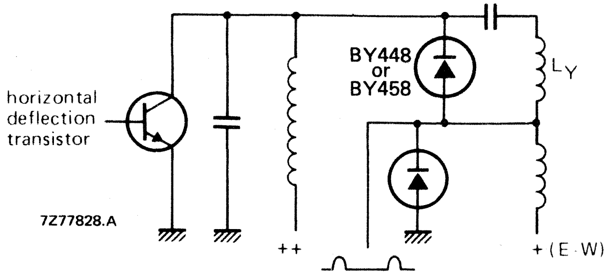


Fig. 9 Basic high-voltage E–W modulator circuit.

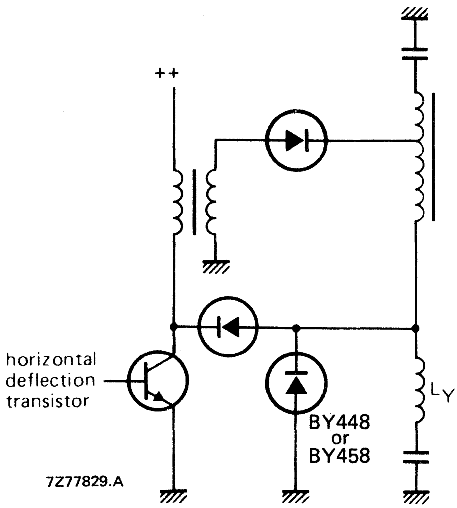


Fig. 10 Basic self-regulating time base circuit (S.R.T.).

HIGH VOLTAGE SOFT RECOVERY RECTIFIER DIODE

Glass-passivated rectifier diode in hermetically sealed axial-leaded glass envelope. It is intended as general purpose rectifier for high frequencies and features non-snap-off (soft recovery) switching characteristics.

QUICK REFERENCE DATA

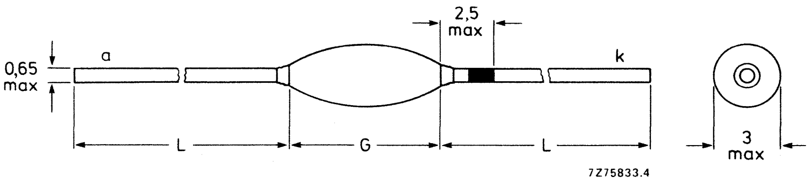
Working reverse voltage	V_{RW}	max.	2000	V
Repetitive peak reverse voltage	V_{RRM}	max.	2200	V
Average forward current	$I_{F(AV)}$	max.	85	mA
Repetitive peak forward current	I_{FRM}	max.	800	mA
Junction temperature	T_j	max.	120	°C
Reverse recovery charge	Q_s	<	1,0	nC

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.

G = max. 4,9; L = min. 32,5.



The cathode is indicated by a black band on the lead.

RATINGS

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

Working reverse voltage	V_{RW}	max.	2000 V
Repetitive peak reverse voltage	V_{RRM}	max.	2200 V
Non-repetitive peak reverse voltage; $t \leq 10$ ms	V_{RSM}	max.	2200 V
Average forward current averaged over any 20 ms period;			
T_{tp} = 25 °C; lead length = 10 mm	$I_{F(AV)}$	max.	85 mA
T_{amb} = 60 °C; Fig. 2	$I_{F(AV)}$	max.	50 mA
Repetitive peak forward current	I_{FRM}	max.	800 mA
Non-repetitive peak forward current $t \leq 10$ ms	I_{FSM}	max.	5 A
Storage temperature	T_{stg}	−65 to + 120 °C	
Junction temperature	T_j	max.	120 °C

THERMAL RESISTANCE

From junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-wiring board; Cu-thickness ≥ 40 μm; see Fig. 2	$R_{th\ j\text{-}a}$	=	155 K/W

CHARACTERISTICS

Forward voltage I_F = 100 mA; T_j = 120 °C	V_F	<	8,5 V
Reverse current $V_R = V_{RW}$; T_j = 120 °C	I_R	<	3 μA
Reverse recovery when switched from I_F = 100 mA to $V_R \geq 100$ V with $-dI_F/dt$ = 200 mA/μs; T_j = 25 °C			
recovery charge	Q_s	<	1 nC
recovery time	t_{rr}	typ.	0,2 μs
fall time	t_f	>	0,1 μs

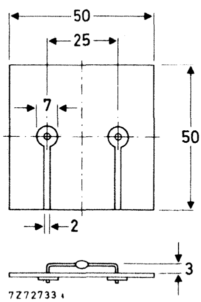


Fig. 2 Mounted on a printed-circuit board.

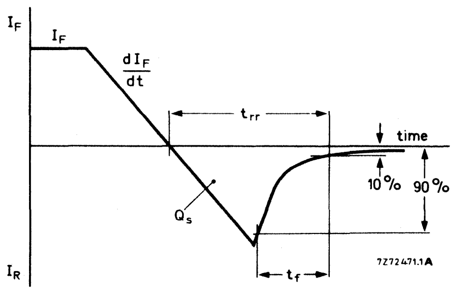


Fig. 3 Definitions of Q_s, t_{rr} and t_f.

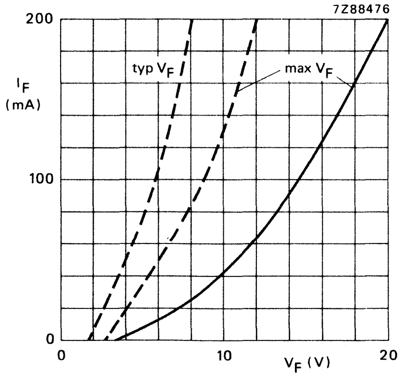


Fig. 4 —— T_j = 25 °C; – – – T_j = 120 °C.

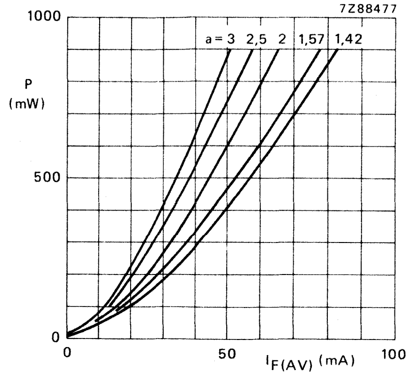


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $\delta = 0{,}5$.

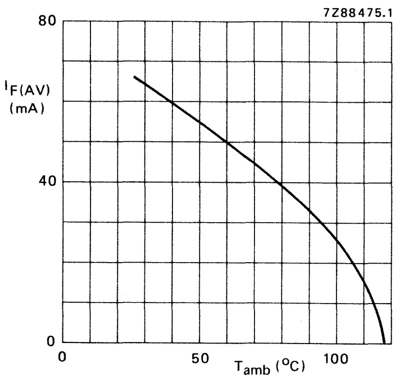


Fig. 6 Maximum permissible average forward current as a function of the ambient temperature; The graph is for switched-mode application. $V_R = V_{RWmax}$, $\delta = 0{,}5$, a = 1,42, Mounting method see Fig. 2.

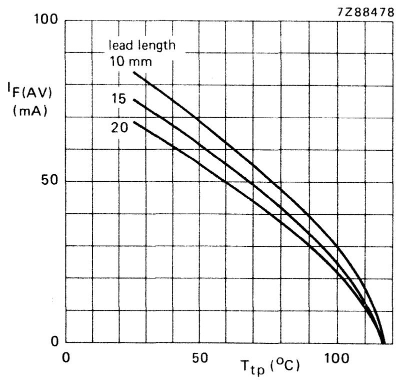


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RWmax}$; $\delta = 0{,}5$; a = 1,42.

SILICON E.H.T. SOFT-RECOVERY RECTIFIER DIODE

E.H.T. rectifier diode in a glass envelope intended for use in high-voltage applications such as multipliers, e.g. tripler circuits. The device features non-snap-off characteristics. Because of the smallness of the envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test-cases).

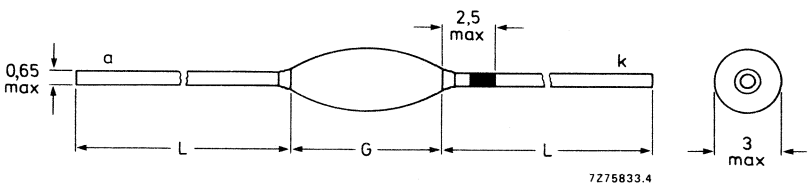
QUICK REFERENCE DATA

Working reverse voltage	V_{RW}	max.	11,5	kV
Repetitive peak reverse voltage	V_{RRM}	max.	15	kV
Average forward current	$I_{F(AV)}$	max.	4	mA
Junction temperature	T_j	max.	120	^oC
Reverse recovery charge	Q_s	<	1	nC
Reverse recovery time	t_{rr}	typ.	0,2	μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.
L = min. 29; G = max. 8,2.



The cathode is indicated by a purple band on the lead.

RATINGS

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

Working reverse voltage	V_{RW}	max.	11,5 kV
Repetitive peak reverse voltage	V_{RRM}	max.	12,5 kV
Repetitive peak reverse voltage; t = 1 min; T_{amb} = 25 °C	V_{RRM}	max.	15 kV
Non-repetitive peak reverse voltage; t ⩽ 10 ms	V_{RSM}	max.	15 kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	4 mA
Repetitive peak forward current	I_{FRM}	max.	500 mA*
Storage temperature	T_{stg}		−65 to +120 °C
Junction temperature	T_j	max.	120 °C

CHARACTERISTICS

Forward voltage I_F = 100 mA; T_j = 120 °C	V_F	<	43 V**
Reverse current V_R = 11,5 kV; T_j = 120 °C	I_R	<	3 μA
Reverse recovery when switched from I_F = 100 mA to V_R ⩾ 100 V with $-dI_F/dt$ = 200 mA/μs; T_j = 25 °C			
recovery charge	Q_s	<	1 nC
recovery time	t_{rr}	typ.	0,2 μs
fall time	t_f	>	0,1 μs

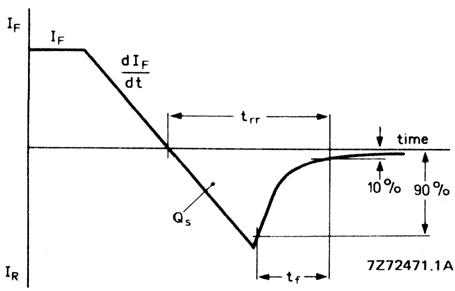


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occurring at flashover in the picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

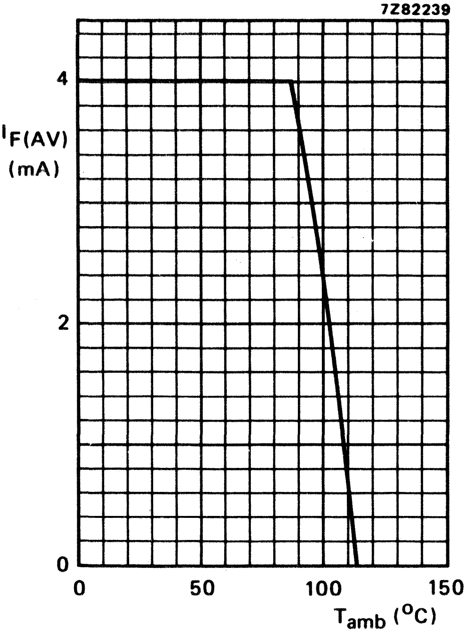


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The device should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ °C/W.

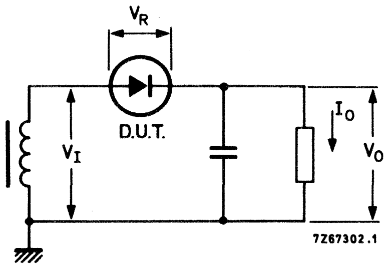


Fig. 4 Typical operation circuit.

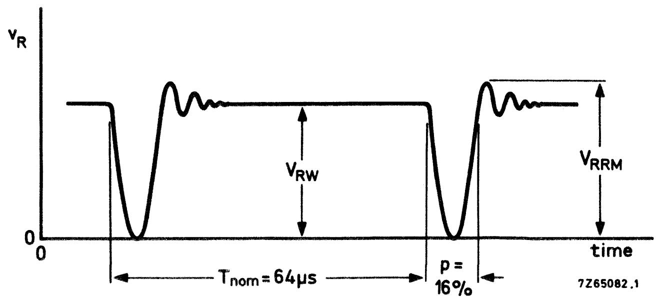


Fig. 5 Typical applied voltage.

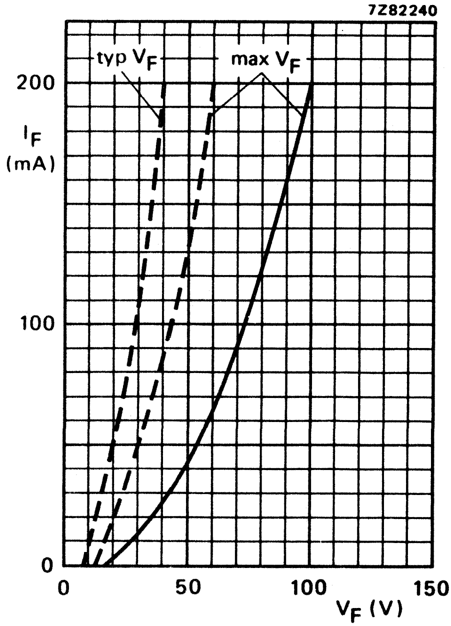


Fig. 6 —— T_j = 25 °C; ---- T_j = 120 °C.

CONTROLLED AVALANCHE RECTIFIER DIODE

Double-diffused glass passivated rectifier diode in hermetically sealed axial-leaded glass envelope capable of absorbing reverse transients, intended for rectifier applications in colour television circuits as well as general purpose applications in telephony equipment.

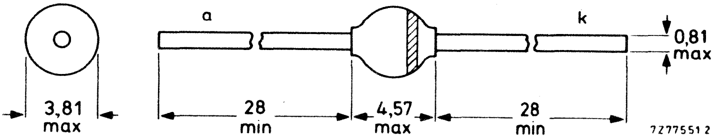
QUICK REFERENCE DATA

Crest working reverse voltage	V_{RWM}	max.	800	V
Repetitive peak reverse voltage	V_{RRM}	max.	1250	V
Average forward current	$I_{F(AV)}$	max.	2	A
Non-repetitive peak forward current	I_{FSM}	max.	50	A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.	1	kW
Junction temperature	T_j	max.	165	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

Repetitive peak reverse voltage ($\delta \leq 1\%$)	V_{RRM}	max.	1250	V
Crest working reverse voltage	V_{RWM}	max.	800	V
Continuous reverse voltage (Fig. 9)*	V_R	max.	800	V
Average forward current (averaged over any 20 ms period);				
T_{tp} = 35 °C; lead length 10 mm	$I_{F(AV)}$	max.	2	A
T_{amb} = 75 °C; Fig. 2	$I_{F(AV)}$	max.	0,8	A
Repetitive peak forward current	I_{FRM}	max.	12	A
Non-repetitive peak forward current (see Figs 7 and 12) (t = 10 ms; half sine-wave)	I_{FSM}	max.	50	A
Non-repetitive peak reverse power dissipation (t = 20 μs; half sine-wave); $T_j = T_{j\,max}$ prior to surge	P_{RSM}	max.	1	kW
Non-repetitive peak reverse avalanche mode pulse energy; I_R = 1 A; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	20	mJ
Storage temperature	T_{stg}	−65 to +175		°C
Junction temperature (see Fig. 9)	T_j	max.	165	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ≥ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\,j\text{-}a}$	=	100	K/W

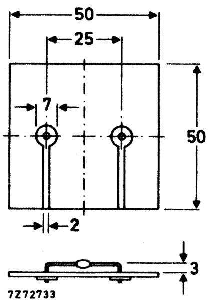


Fig. 2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage*			
I_F = 1 A	V_F	<	1 V
I_F = 10 A	V_F	<	1,65 V
Reverse avalanche breakdown voltage			
I_R = 0,1 mA	$V_{(BR)R}$	>	1250 V
Reverse current			
$V_R = V_{RWM\,max}$ **	I_R	<	1,0 μA
$V_R = V_{RWM\,max}$; T_j = 100 °C	I_R	<	10 μA
Reverse recovery charge when switched from I_F = 1 A to $V_R \geq 50$ V with $-dI_F/dt$ = 5 A/μs	Q_s	typ.	3 μC
Reverse recovery time when switched from I_F = 1 A to $V_R \geq 50$ V at i_{rr} = 10% of I_R with $-dI_F/dt$ = 5 A/μs	t_{rr}	typ.	2,5 μs

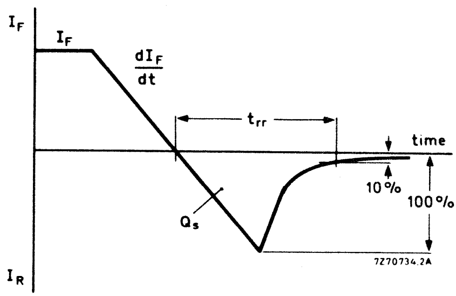


Fig. 3 Definitions of t_{rr} and Q_s.

Diode capacitance			
V_R = 0 V; f = 1 MHz	C_d	typ.	50 pF

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

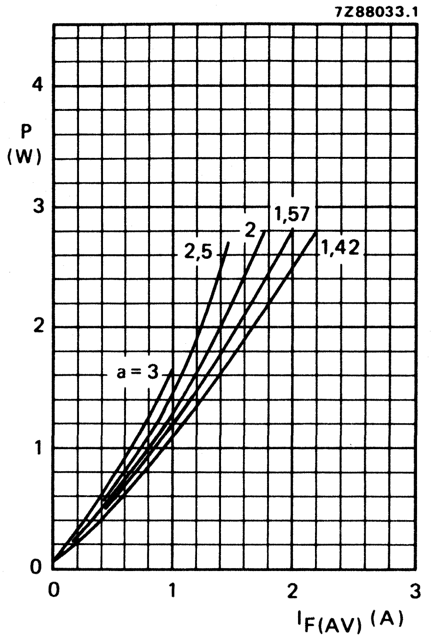


Fig. 4 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

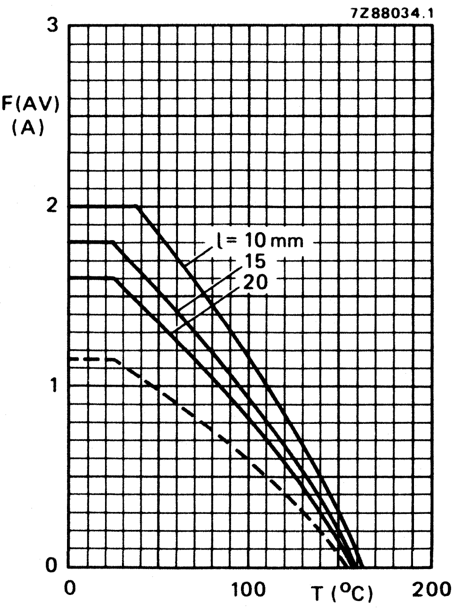


Fig. 5 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.

a = 1,57; $V_R = V_{RWMmax}$; l = lead length

——— T = tie-point temperature

– – – – T = ambient temperature and device mounted as shown in Fig. 2.

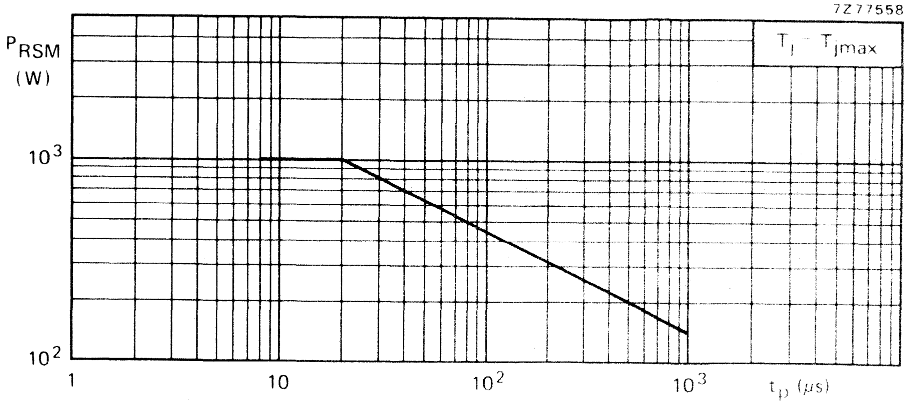
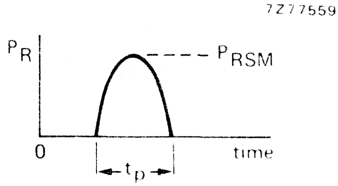


Fig. 6 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



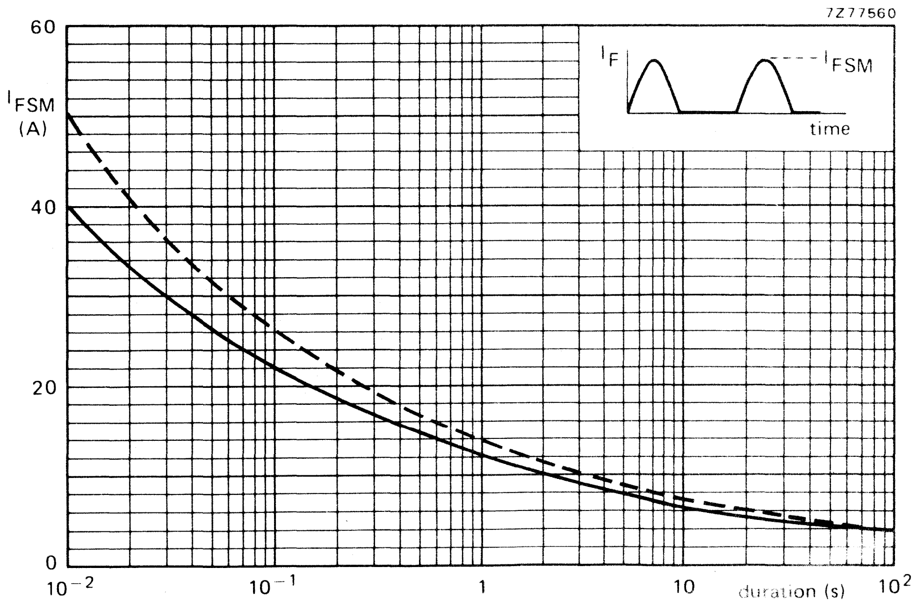


Fig. 7 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz)

- – – – T_j = 25 °C; V_R = 0.
- ——— $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWMmax}$.

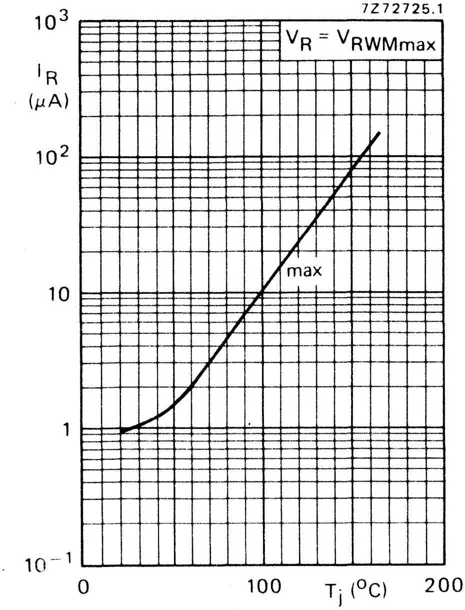


Fig. 8.

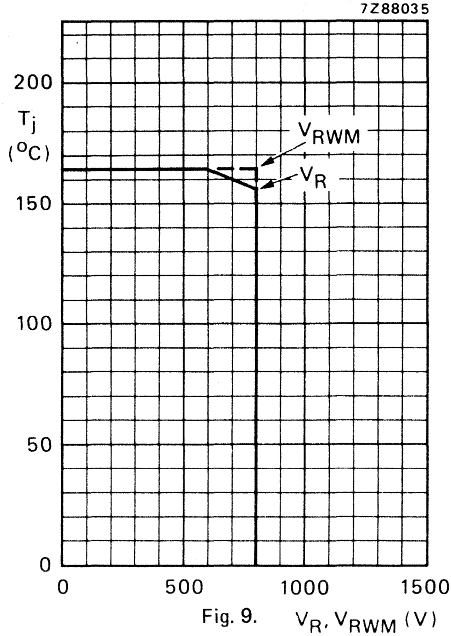


Fig. 9.

f = 50 Hz; sine-wave; $R_{th\ j-a}$ = 100 K/W.

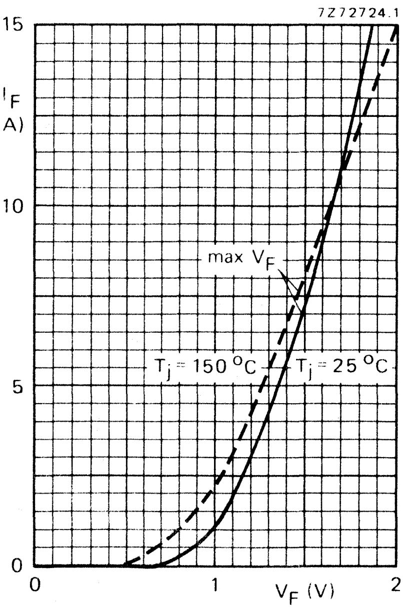


Fig. 10.

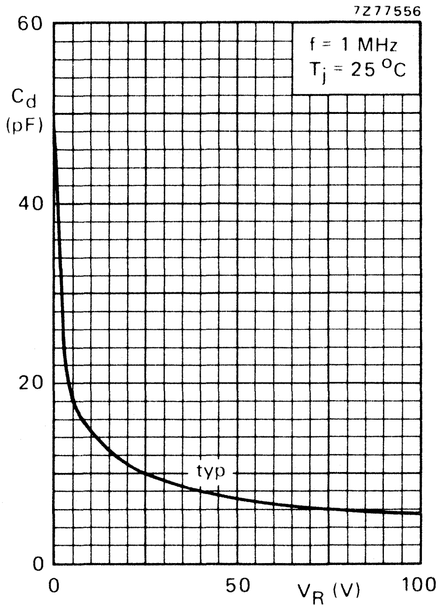


Fig. 11.

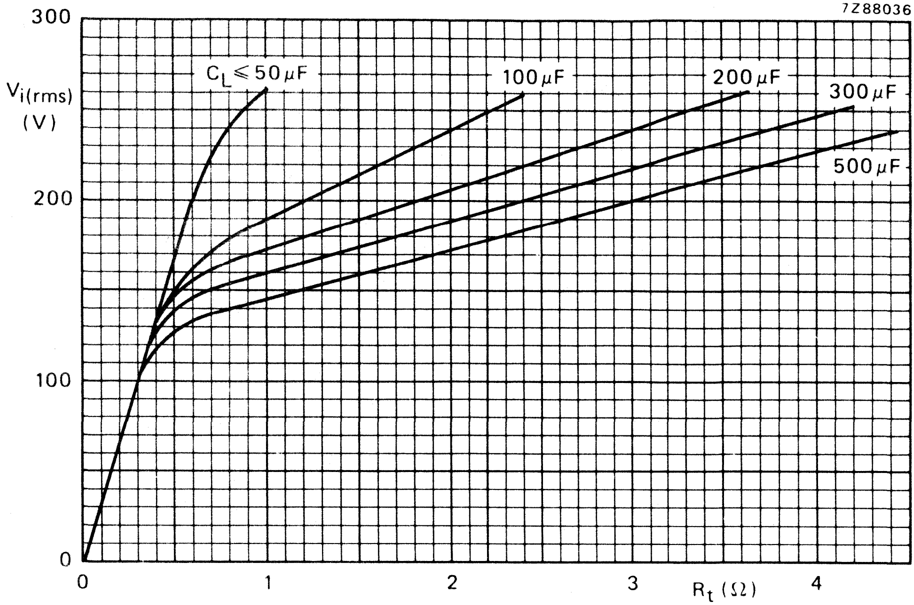


Fig. 12 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

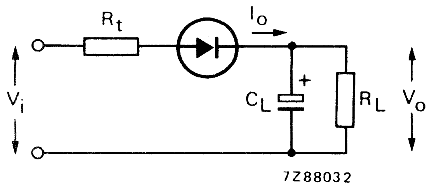


Fig. 13 Test circuit series resistance (R_t).

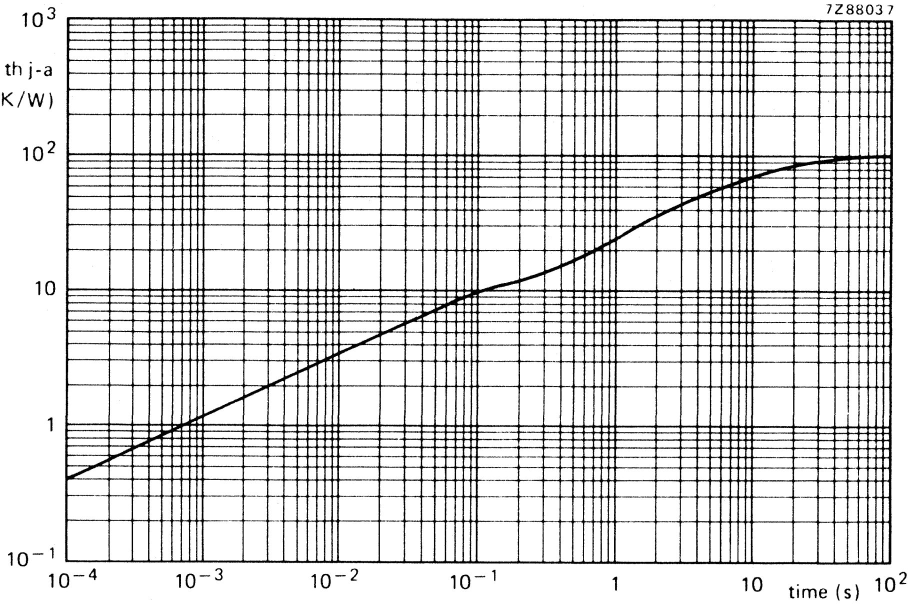


Fig. 14.
Device mounted on a printed circuit board (see Fig. 2).

HIGH VOLTAGE SOFT RECOVERY RECTIFIER DIODE

Glass-passivated rectifier diode in hermetically sealed axial-lead glass envelope. For high voltage applications such as grid 2 supply in colour television picture tubes and as general purpose rectifiers for high frequencies. The diode has non-snap-off characteristics.

QUICK REFERENCE DATA

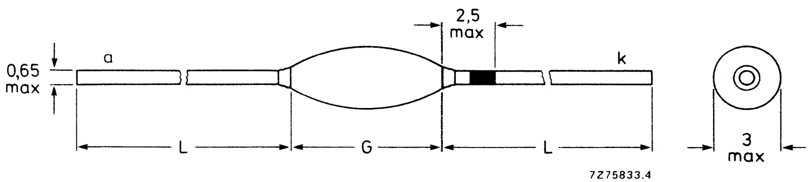
Working reverse voltage	V_{RW}	max.	1500 V
Repetitive peak reverse voltage	V_{RRM}	max.	1800 V
Average forward current	$I_{F(AV)}$	max.	85 mA
Repetitive peak forward current	I_{FRM}	max.	800 mA
Junction temperature	T_j	max.	120 °C
Reverse recovery charge	Q_s	<	1,0 nC

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61A.

G = max. 4,9; L = min. 32,5.



The cathode is indicated by a black band on the lead.
Diodes are type branded.

RATINGS

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

Working reverse voltage	V_{RW}	max.	1500 V
Repetitive peak reverse voltage	V_{RRM}	max.	1800 V
Non-repetitive peak reverse voltage	V_{RSM}	max.	1800 V
Average forward current (averaged over any 20 ms)			
T_{tp} = 25 °C; lead length = 10 mm	$I_{F(AV)}$	max.	85 mA
T_{amb} = 60 °C; p.c.b. mounting see Fig. 2	$I_{F(AV)}$	max.	50 mA
Repetitive peak forward current	I_{FRM}	max.	800 mA
Non-repetitive peak forward current t < 10 ms, half sinewave, $T_j = T_{j\,max}$ prior to surge	I_{FSM}	max.	5 A
Storage temperature	T_{stg}	−65 to +120 °C	
Junction temperature	T_j	max.	120 °C

THERMAL RESISTANCE

From junction to ambient when mounted on a 1,5 mm thick epoxy-glass p.c.b.; Cu-thickness > 40 μm; see Fig. 2	$R_{th\,j\text{-}a}$	=	155 K/W

CHARACTERISTICS

Forward voltage * I_F = 100 mA; T_j = 120 °C	V_F	<	8,5 V
Reverse current $V_R = V_{RW}$; T_j = 120 °C	I_R	<	3 μA
Reverse recovery when switched from I_F = 100 mA to V_R > 100 V with $-dI_F/dt$ = 200 mA/μs; T_j = 25 °C			
recovery charge	Q_s	<	1 nC
recovery time	t_{rr}	typ.	0,2 μs
fall time	t_f	>	0,1 μs

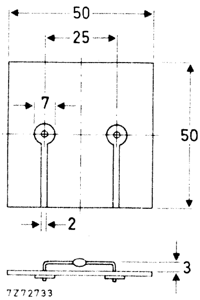


Fig. 2 Device mounted on a printed circuit board.

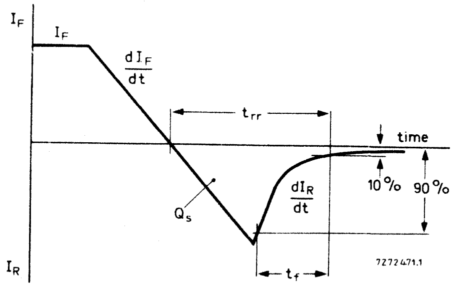


Fig. 3 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

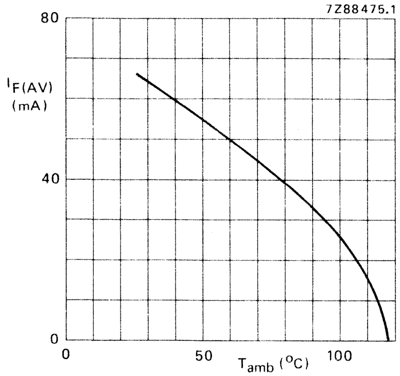


Fig. 4 Maximum permissible average forward current as a function of the ambient temperature; $V_R = V_{RW\,max}$; a = 1,42, mounting Fig. 2.

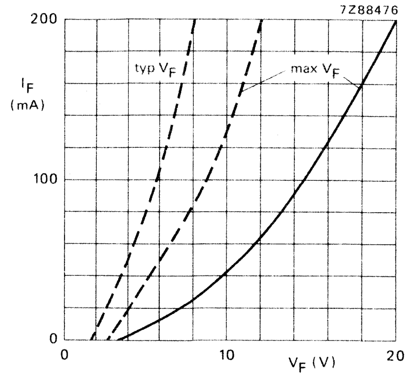


Fig. 5 —— T_j = 25 °C; – – – T_j = 120 °C.

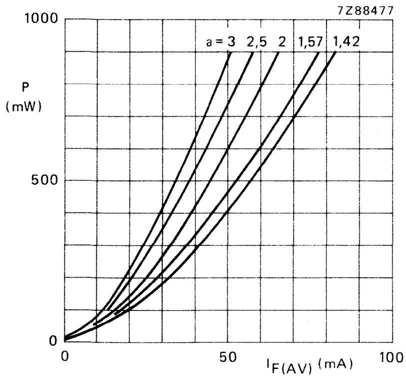


Fig. 6 Steady state power dissipation (forward plus leakage current but excluding switching losses) as a function of average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RW\,max}$; δ = 0,5.

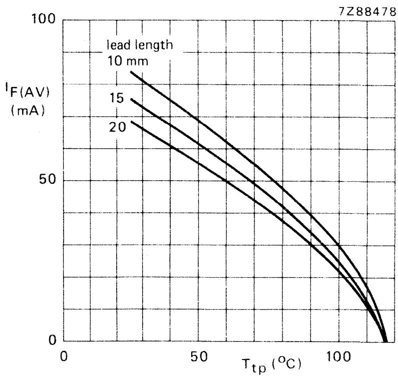


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

a = 1,42; $V_R = V_{RW\,max}$; δ = 0,5*.

* Figs 4 and 7 apply to switched mode application.

APPLICATION INFORMATION

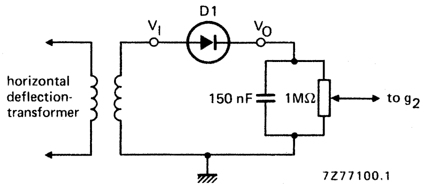


Fig. 8 Basic circuit for voltage supply of grid 2 incolour television picture tubes. D_1 = BY584. Stable continuous operation is ensured at an ambient temperature up to 70 °C.

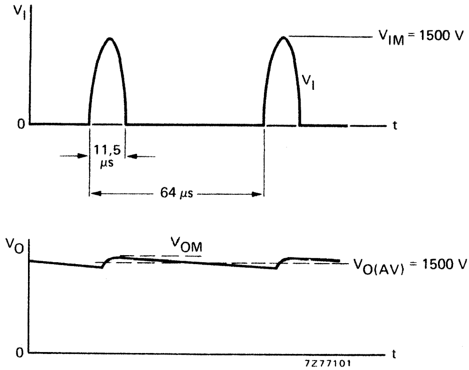


Fig. 9 Waveform.

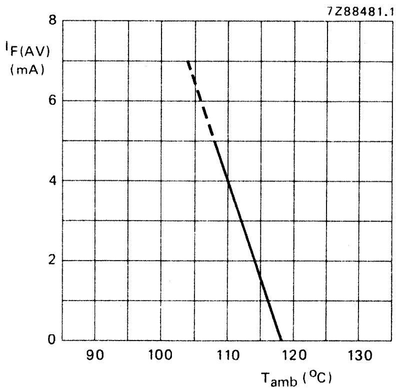


Fig. 10 Maximum permissible average forward current as a function of ambient temperature. V_R = 1500 V; diode used in circuit Fig. 8 mounted as in Fig. 2.

OPERATING NOTES

The various components of junction temperature rise above ambient, for mounting with symmetrical lead length, are illustrated below.

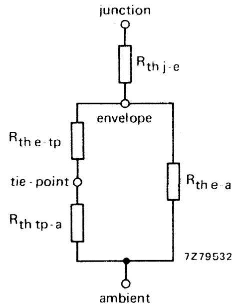


Fig. 11 Thermal model. $R_{th\ j\text{-}e} = 35$ K/W.

The thermal resistances between envelope and tie-point, and between envelope and ambient depend on lead length.

lead length	5	10	15	20	25	mm
$R_{th\ e\text{-}tp}$	38	76	114	152	190	K/W
$R_{th\ e\text{-}a}$	750	560	410	330	280	K/W

The thermal resistance between tie-point and ambient depends on the mounting method; for mounting on a 1,5 mm thick epoxy-glass printed-circuit board with a copper-thickness ⩾ 40 μm, the following values apply:

1. Mounted as given in Fig. 2 the thermal resistance $R_{th\ tp\text{-}a}$ is 70 K/W.
2. Mounted with copper laminate of 1 cm^2 per lead $R_{th\ tp\text{-}a}$ is 55 K/W.
3. Mounted with copper laminate of 2,25 cm^2 per lead $R_{th\ tp\text{-}a}$ is 45 K/W.

Note
Any temperature can be calculated by using the dissipation graph (Fig. 6) and the above thermal model.

BASE-EMITTER EFFICIENCY DIODE

Solid-glass passivated rectifier diode in a hermetically sealed axial-leaded glass envelope. The device is intended for use as efficiency diode in horizontal deflection circuits between base and emitter terminals of the output transistor.

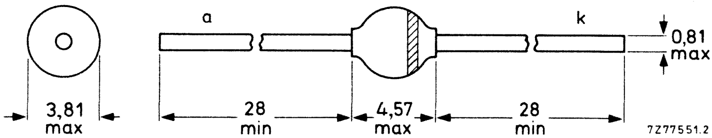
QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	50	V
Continuous reverse voltage	V_R	max.	25	V
Average forward current	$I_{F(AV)}$	max.	1,5	A
Non-repetitive peak forward current	I_{FSM}	max.	25	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Forward conduction delay	t_d	>	0,7	μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

Repetitive peak reverse voltage	V_{RRM}	max.	50	V
Continuous reverse voltage	V_R	max.	25	V
Average forward current (averaged over any 20 ms period)				
T_{tp} = 65 °C; lead length 10 mm (a = 1,42)*	$I_{F(AV)}$	max.	1,5	A
T_{amb} = 65 °C; Fig. 2	$I_{F(AV)}$	max.	0,87	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current (t = 10 ms; half-sinewave) $T_j = T_{j\ max}$ prior to surge; $V_R = V_{RRMmax}$	I_{FSM}	max.	25	A
Storage temperature	T_{stg}	−65 to +175		°C
Operating junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	100	K/W

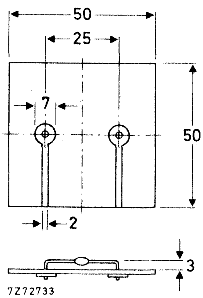


Fig. 2 Mounted on a printed-circuit board.

* a = $I_{F(RMS)}/I_{F(AV)}$.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage*			
I_F = 3 A	V_F	<	1,6 V
I_F = 3 A; T_j = 175 °C	V_F	<	1,54 V
Reverse current			
$V_R = V_{RRMmax}$	I_R	<	5 μA
Forward conduction delay			
V_F = 6 V; T_j = 175 °C	t_d	>	0,7 μs

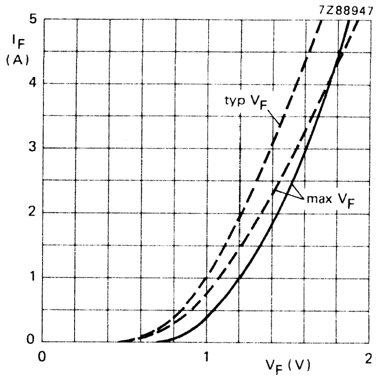


Fig. 3 ——— T_j = 25 °C; – – – – T_j = 175 °C.

* Measured under pulse conditions to avoid excessive dissipation.

SILICON E.H.T. AVALANCHE RECTIFIER DIODES

E.H.T. rectifier diodes in glass envelopes. For use in high-voltage applications such as multipliers, especially in diode-split transformers. The devices feature non-snap-off characteristics and are capable of absorbing avalanche energy e.g. during flashover in a picture tube. Because of the small envelope, the diode should be used in a suitable insulating medium (resin, oil or special arrangements in test-cases).

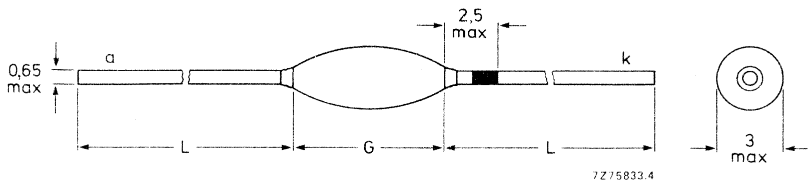
QUICK REFERENCE DATA

			BY609	BY610	
Working reverse voltage	V_{RW}	max.	12	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	15	17	kV
Average forward current	$I_{F(AV)}$	max.	4		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	<	1		nC
Reverse recovery time	t_{rr}	typ.	0,2		µs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.
L = 29,5 min.
G = 8,9 max.



The cathode of the BY609 is indicated by a yellow band on the lead.
The cathode of the BY610 is indicated by an orange band on the lead.

RATINGS

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

			BY609	BY610	
Working reverse voltage	V_{RW}	max.	12	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	12	12	kV
Repetitive peak reverse voltage ▲ t = 1 min.; T_{amb} = 25 °C	V_{RRM}	max.	15	17	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	4		mA
Repetitive peak forward current *	I_{FRM}	max.	500		mA
Storage temperature	T_{stg}		−65 to +120		°C
Junction temperature	T_j	max.	120		°C

CHARACTERISTICS

Forward voltage ** I_F = 100 mA; T_j = 120 °C	V_F	<	50	V
Reverse current V_R = 12 kV; T_j = 120 °C	I_R	<	3	μA
Reverse recovery when switched from I_F = 100 mA to V_R > 100 V with $-dI_F/dt$ = 200 mA/μs; T_j = 25 °C				
recovery charge	Q_s	<	1	nC
recovery time	t_{rr}	typ.	0,2	μs
fall time	t_f	>	0,08	μs

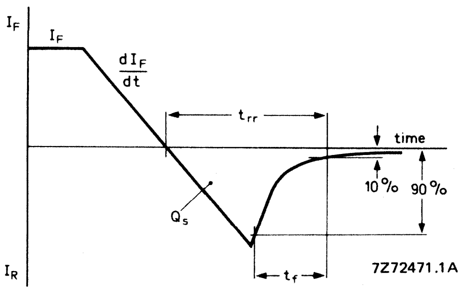


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

▲ The device can withstand the avalanche energy e.g. during flashover in a picture tube.
* The device can withstand peak currents occurring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

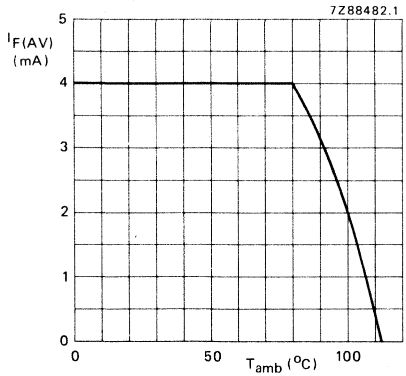


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j-a} \leq 120$ K/W.

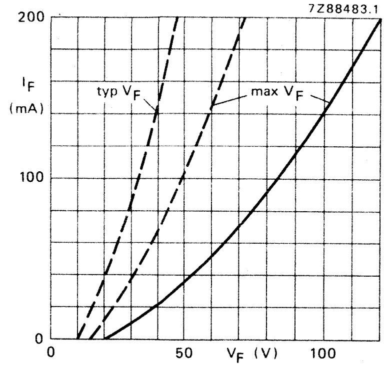


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

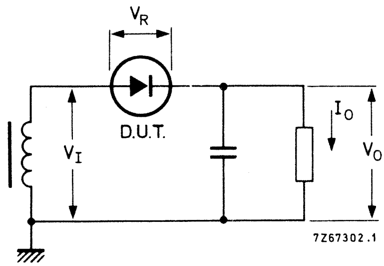


Fig. 5 Typical operation circuit.

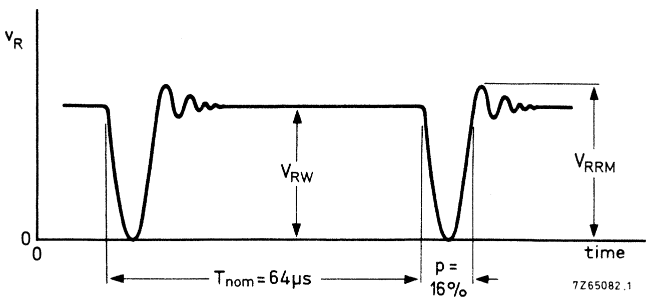


Fig. 6 Typical applied voltage.

MINIATURE HIGH-VOLTAGE SOFT-RECOVERY RECTIFIER DIODE

Glass-passivated rectifier diode in a miniature hermetically sealed axial-leaded glass envelope. It is intended as a general purpose rectifier for high frequencies and high voltages and owing to its small size this diode is extremely suitable for mounting in miniature assemblies, such as voltage multipliers.

Because of the small envelope, the diode should be well insulated (insulating material: resin, oil or with special arrangements in test cases-SF6 gas).

QUICK REFERENCE DATA

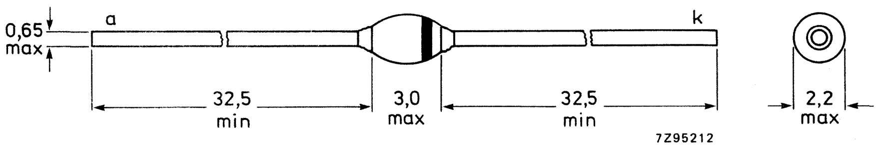
Working reverse voltage	V_{RW}	max.	2000	V
Repetitive peak reverse voltage	V_{RRM}	max.	2200	V
Average forward current	$I_{F(AV)}$	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	500	mA
Junction temperature	T_j	max.	150	°C
Reverse recovery time	t_{rr}	<	300	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61H2.

L = 32,5 min.
G = 3,0 max.



The cathode is indicated by a coloured band.

RATINGS

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

Continuous reverse voltage	V_R	max.	2000	V
Working reverse voltage	V_{RW}	max.	2000	V
Repetitive peak reverse voltage	V_{RRM}	max.	2200	V
Non-repetitive peak reverse voltage $t \leqslant 10$ ms	V_{RSM}	max.	2200	V
Average forward current (averaged over any 20 ms period); $T_{amb} = 65\ ^oC$	$I_{F(AV)}$	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	500	mA
Non-repetitive peak forward current; t = 10 ms; half sine-wave; $T_j = T_{j\,max}$ prior to surge; re-applied V_{RW}	I_{FSM}	max.	1	A
Storage temperature	T_{stg}	−65 to + 150		^oC
Junction temperature	T_j	max.	150	^oC

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	=	155	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Forward voltage*				
$I_F = 50$ mA; $T_j = 150\ ^oC$	V_F	<	6	V
$I_F = 200$ mA	V_F	<	20	V
$I_F = 200$ mA; $T_j = 150\ ^oC$	V_F	<	12	V
Reverse current**				
$V_R = 2000$ V	I_R	typ.	5	nA
		<	20	nA
$V_R = 2000$ V; $T_j = 120\ ^oC$	I_R	<	3	μA
Reverse recovery time when switched from $I_F = 100$ mA to $V_R \geqslant 100$ V with $-dI_F/dt = 200$ mA/μs	t_{rr}	<	300	ns
Diode capacitance at f = 1 MHz $V_R = 100$ V	C_d	<	1	pF

* Measured under pulsed conditions to avoid excessive dissipation.

** Illumination $\leqslant$ 300 lux; relative humidity $\leqslant$ 65%.

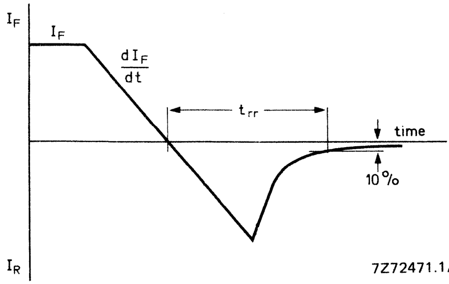


Fig. 2 Definition of t_{rr}.

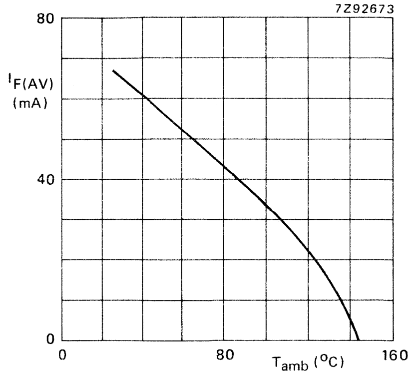


Fig. 3 Maximum permissible average forward current vs. ambient temperature; a = 1,57.

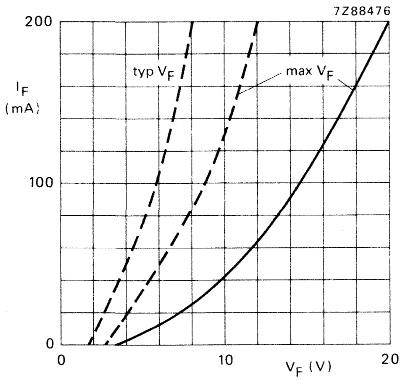


Fig. 4 Forward current vs. forward voltage ——— T_j = 25 °C; – – – – T_j = 150 °C.

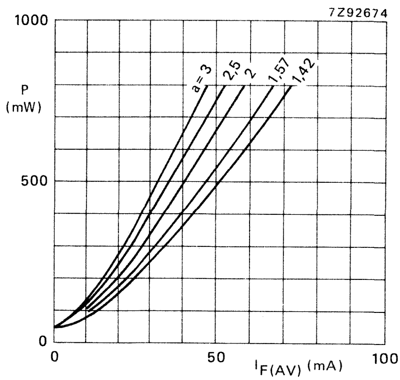


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses vs. average forward current; a = $I_{F(RMS)}/I_{F(AV)}$.

Conditions for Figs 3 and 5:
switched-mode application; $V_R = V_{RWmax}$; δ = 0,5.

E.H.T. AVALANCHE VERY FAST SOFT-RECOVERY DIODES

E.H.T. rectifier diodes in hermetically-sealed, axially-leaded glass envelope and designed for c.t.v. and monitor applications with frequencies up to 128 kHz. They are suitable for use in high-voltage application such as multipliers and especially in diode-split transformers.

Because of the small envelope, the diode should be used in a suitable insulating medium (resin, oil or SF6 gas).

Features:

- Non-snap-off characteristics;
- Capable of absorbing avalanche energy e.g. during flash-over in picture tubes.

QUICK REFERENCE DATA

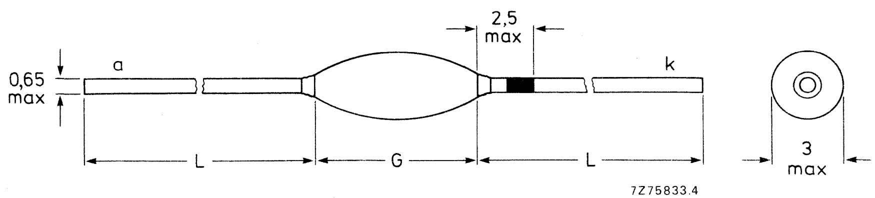
			BY619	BY620	
Working reverse voltage	V_{RW}	max.	12	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	15	17	kV
Average forward current	$I_{F(AV)}$	max.	4		mA
Junction temperature	T_j	max.	120		^oC
Reverse recovery charge	Q_s	<	0,4		nC
Reverse recovery time	t_{rr}	typ.	100		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.

L = 28 min.
G = 11 max.



The BY619 cathode is indicated by a curry yellow band on the lead.
The BY620 cathode is indicated by a lilac band on the lead.

RATINGS

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

			BY619	BY620	
Working reverse voltage	V_{RW}	max.	12	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	12	12	kV
Repetitive peak reverse voltage* t = 1 min.; T_{amb} = 25 °C	V_{RRM}	max.	15	17	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	4		mA
Repetitive peak forward current**	I_{FRM}	max.	500		mA
Storage temperature	T_{stg}		−65 to + 120		°C
Junction temperature	T_j	max.	120		°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage ▲ I_F = 100 mA; T_j = 120 °C	V_F	<	75	V
Reverse current $V_R = V_{RW}$; T_j = 120 °C	I_R	<	3	μA
Reverse recovery when switched from I_F = 100 mA to $V_R \geq 100$ V with $-dI_F/dt$ = 200 mA/μs				
recovery charge	Q_s	<	0,4	nC
recovery time at I_R = 1 mA	t_{rr}	typ.	100	ns
fall time at I_R = 1 mA	t_f	>	40	ns

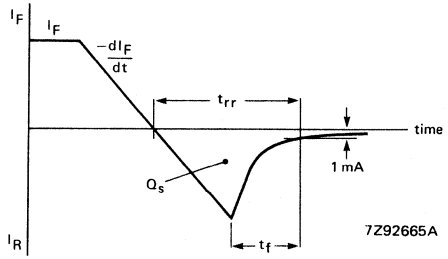


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Capable of withstanding the avalanche energy e.g. during flash-over in a picture tube.
** Capable of withstanding peak currents during flash-over in a picture tube.
▲ Measured under pulse conditions to avoid excessive dissipation.

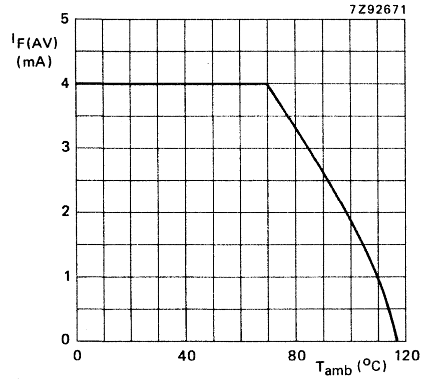


Fig. 3 Maximum permissible average forward current versus ambient temperature; the current includes losses due to reverse leakage. Diode to be mounted such that $R_{th\ j\text{-}a} < 120$ K/W.

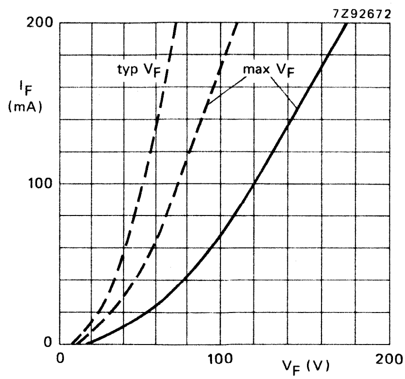


Fig. 4 ——— $T_j = 25$ °C; – – – $T_j = 120$ °C.

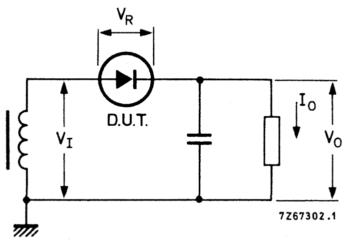


Fig. 5 Typical operation circuit.

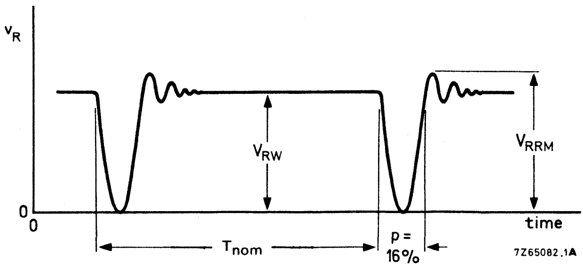


Fig. 6 Typical applied voltage.

SILICON E.H.T. SOFT-RECOVERY RECTIFIER DIODES

E.H.T. rectifier diodes in glass envelopes intended for use in high-voltage applications such as the high-voltage supply of television receivers and monitors. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test-cases).

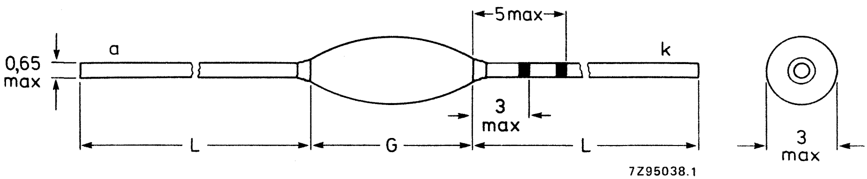
QUICK REFERENCE DATA

			BY707	708	709	
Working reverse voltage	V_{RW}	max.	8	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	9	12	14	kV
Average forward current	$I_{F(AV)}$	max.		4		mA
Junction temperature	T_j	max.		120		^oC
Reverse recovery charge	Q_s	<		1		nC
Reverse recovery time	t_{rr}	typ.		0,2		μs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.
L = 29 min.
G = 9,5 max.



The cathode of the BY707 is indicated by two red bands on the lead.
The cathode of the BY708 is indicated by a red band on the lead.
The cathode of the BY709 is indicated by a red band (inner) and a violet band (outer) on the lead.

RATINGS

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

			BY707	708	709	
Working reverse voltage	V_{RW}	max.	8	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	9	12	14	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	9	12	14	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.		4		mA
Repetitive peak forward current*	I_{FRM}	max.		500		mA*
Storage temperature	T_{stg}			−65 to + 120		°C
Junction temperature	T_j	max.		120		°C

CHARACTERISTICS

Forward voltage** $I_F = 100$ mA; $T_j = 120$ °C	V_F	<	52	V**
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3	μA
Reverse recovery when switched from $I_F = 100$ mA to $V_R \geq 100$ V with $-dI_F/dt = 200$ mA/μs; $T_j = 25$ °C				
recovery charge	Q_s	<	1	nC
recovery time	t_{rr}	typ.	0,2	μs
fall time	t_f	>	0,1	μs

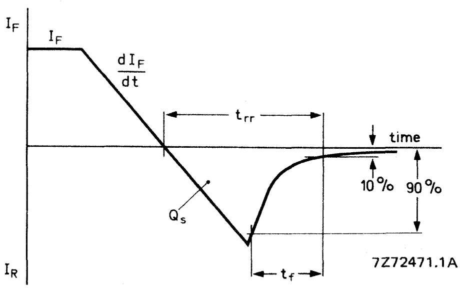


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occuring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

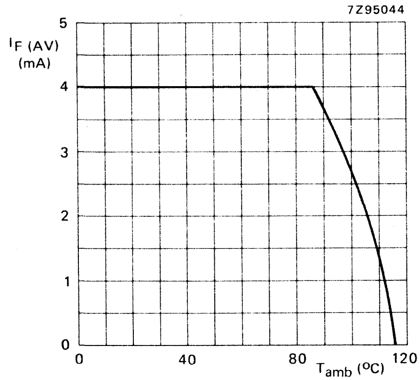


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leqslant 120$ K/W.

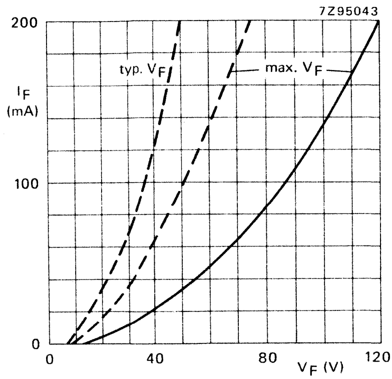


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

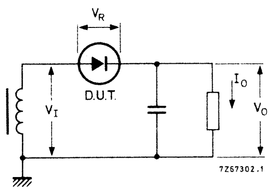


Fig. 5 Typical operation circuit.

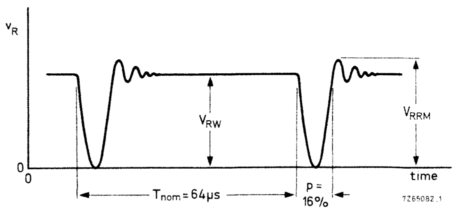


Fig. 6 Typical applied voltage.

SILICON E.H.T. SOFT-RECOVERY RECTIFIER DIODES

E.H.T. rectifier diodes in glass envelopes intended for use in high-voltage applications such as the high-voltage supply of television receivers and monitors. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test cases).

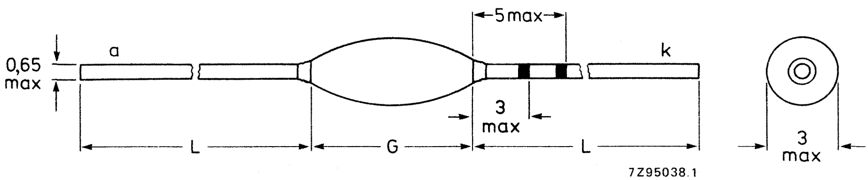
QUICK REFERENCE DATA

			BY710	711	
Working reverse voltage	V_{RW}	max.	14	16	kV
Repetitive peak reverse voltage	V_{RRM}	max.	17	19	kV
Average forward current	$I_{F(AV)}$	max.	3		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	<	1		nC
Reverse recovery time	t_{rr}	typ.	0,2		µs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.
L = 28 min.
G = 11 max.



The cathode of the BY710 is indicated by two green bands on the lead.
The cathode of the BY711 is indicated by a green band on the lead.

RATINGS

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

			BY710	711	
Working reverse voltage	V_{RW}	max.	14	16	kV
Repetitive peak reverse voltage	V_{RRM}	max.	17	19	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	17	19	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	3		mA
Repetitive peak forward current*	I_{FRM}	max.	500		mA
Storage temperature	T_{stg}		−65 to + 120		°C
Junction temperature	T_j	max.	120		°C

CHARACTERISTICS

Forward voltage ** $I_F = 100$ mA; $T_j = 120$ °C	V_F	<	70	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3	µA
Reverse recovery when switched from $I_F = 100$ mA to $V_R \geqslant 100$ V; $-dI_F/dt = 200$ mA/µs; $T_j = 25$ °C				
recovery charge	Q_s	<	1	nC
recovery time	t_{rr}	typ.	0,2	µs
fall time	t_f	>	0,1	µs

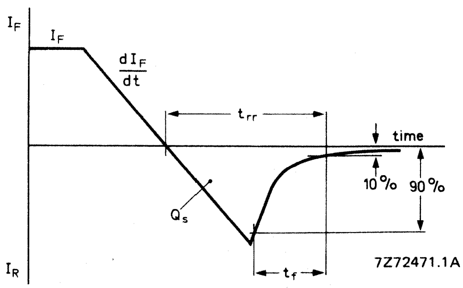


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occurring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

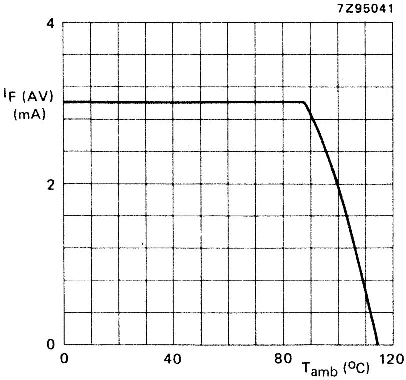


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ K/W.

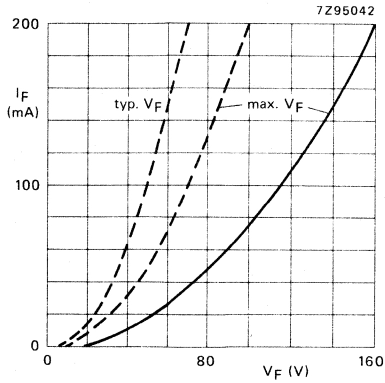


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

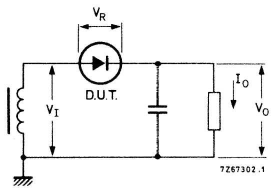


Fig. 5 Typical operation circuit.

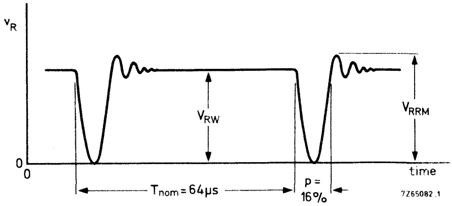


Fig. 6 Typical applied voltage.

SILICON E.H.T. SOFT-RECOVERY RECTIFIER DIODES

E.H.T. rectifier diodes in glass envelopes intended for use in high-voltage applications such as the high-voltage supply of television receivers and monitors. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test-cases).

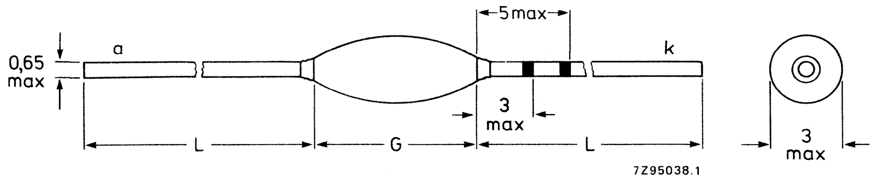
QUICK REFERENCE DATA

			BY712	713	714	
Working reverse voltage	V_{RW}	max.	18	20	24	kV
Repetitive peak reverse voltage	V_{RRM}	max.	22	24	30	kV
Average forward current	$I_{F(AV)}$	max.		3		mA
Junction temperature	T_j	max.		120		°C
Reverse recovery charge	Q_s	<		1		nC
Reverse recovery time	t_{rr}	typ.		0,2		µs

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61.
L = 27 min.
G = 12,5 max.



The cathode of the BY712 is indicated by two blue bands on the lead.
The cathode of the BY713 is indicated by a blue band on the lead.
The cathode of the BY714 is indicated by a light blue band on the lead.

RATINGS

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

			BY712	713	714	
Working reverse voltage	V_{RW}	max.	18	20	24	kV
Repetitive peak reverse voltage	V_{RRM}	max.	22	24	30	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	22	24	30	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.		3		mA
Repetitive peak forward current*	I_{FRM}	max.		500		mA
Storage temperature	T_{stg}			−65 to + 120		°C
Junction temperature	T_j	max.		120		°C

CHARACTERISTICS

Forward voltage** $I_F = 50$ mA; $T_j = 120$ °C	V_F	<	76	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3	μA
Reverse recovery when switched from $I_F = 100$ mA to $V_R \geqslant 100$ V with $-dI_F/dt = 200$ mA/μs; $T_j = 25$ °C				
recovery charge	Q_s	<	1	nC
recovery time	t_{rr}	typ.	0,2	μs
fall time	t_f	>	0,1	μs

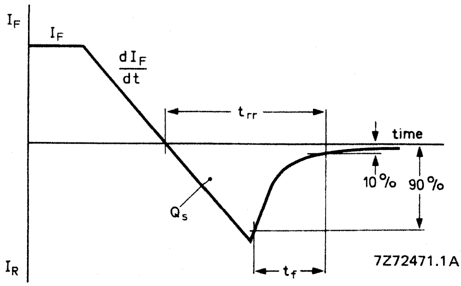


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occurring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

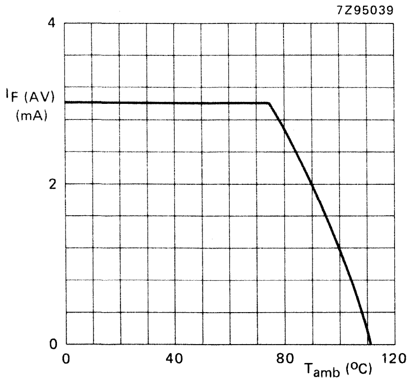


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ K/W.

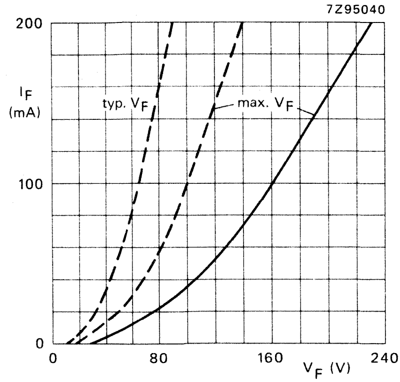


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

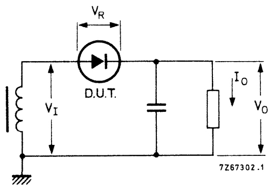


Fig. 5 Typical operation circuit.

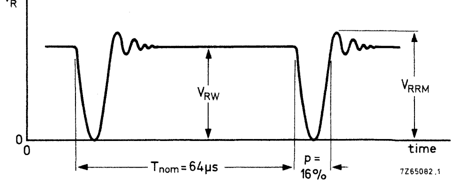


Fig. 6 Typical applied voltage.

CONTROLLED AVALANCHE RECTIFIER DIODES

Rectifier diodes in hermetically sealed axial-leaded ID* envelopes and intended for general purpose rectifier applications.

The device is capable of absorbing reverse transient energy.

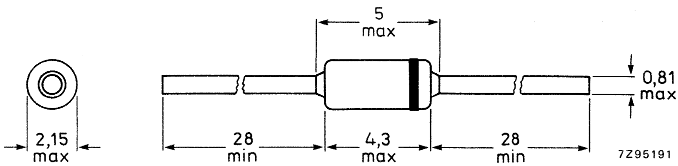
QUICK REFERENCE DATA

			BYD13D	G	J	K	M	
Crest working voltage	V_{RWM}	max.	200	400	600	800	1000	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	225	450	650	900	1100	V
		<	1600	1600	1600	1600	1600	V
Average forward current	$I_{F(AV)}$	max.			1,4			A
Non-repetitive peak forward current	I_{FSM}	max.			20			A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.			0,4			kW
Junction temperature	T_j	max.			175			°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-81.



The marking band indicates the cathode.

* Implosion Diode

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC134).

			BYD13D	G	J	K	M	
Crest working reverse voltage	V_{RWM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V
Average forward current (averaged over any 20 ms period)								
T_{tp} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.			1,4			A
T_{amb} = 65 °C; see Fig. 2	$I_{F(AV)}$	max.			0,75			A
Repetitive peak forward current T_{tp} = 55 °C; f = 50 Hz; a = 3; (inclusive derating for T_{jmax} at V_{RRM} = 1000 V)	I_{FRM}	max.			5,5			A
Non-repetitive peak forward current t = 10 ms, half-sine wave; T_j = T_{jmax} prior to surge; V_R = V_{RWMmax}	I_{FSM}	max.			20			A
Non-repetitive peak reverse power dissipation; t = 20 μs (half-sine wave); T_j = $T_{j\,max}$ prior to surge	P_{RSM}	max.			0,4			kW
Non-repetitive peak reverse avalanche energy; I_R = 0,34 A; T_j = T_{jmax} prior to surge; with inductive load switched off	E_{RSM}	max.			7			mJ
Storage temperature	T_{stg}				−65 to +175			°C
Junction temperature	T_j	max.			175			°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	60	K/W
2. Thermal resistance from junction to ambient; device mounted on an 1,5 mm thick epoxy-glass printed circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	120	K/W

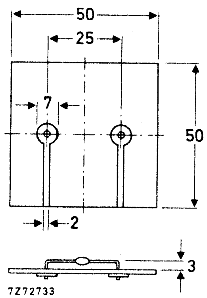


Fig. 2 Device mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD13D	G	J	K	M	
Forward voltage *								
I_F = 1 A	V_F	<	1,05	1,05	1,05	1,05	1,05	V
I_F = 1 A; $T_j = T_{jmax}$	V_F	<	0,93	0,93	0,93	0,93	0,93	V
Reverse avalanche breakdown voltage								
I_R = 0,1 mA	$V_{(BR)R}$	>	225	450	650	900	1100	V
		<	1600	1600	1600	1600	1600	V
Reverse current								
$V_R = V_{RWMmax}$ **	I_R	<			1			μA
$V_R = V_{RWMmax}$; T_j = 165 °C	I_R	<			100			μA
Diode capacitance								
V_R = 0; f = 1 MHz	C_d	typ.			21			pF

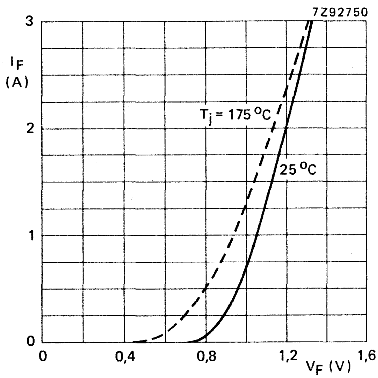


Fig. 3 Maximum forward voltage.

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

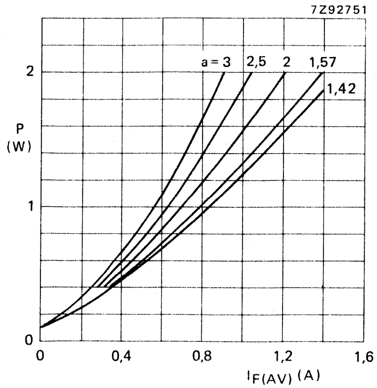


Fig. 4 Maximum values steady state power dissipation (forward plus leakage current) as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

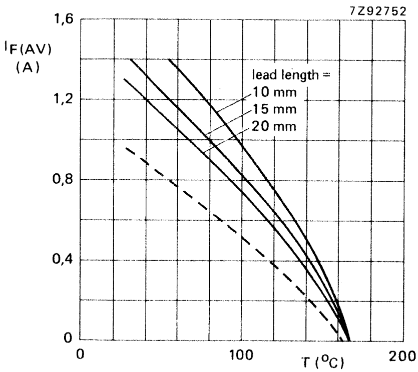


Fig. 5 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$, $\delta = 0,5$; a = 1,57.
---------- = ambient temperature and device mounted as shown in Fig. 2
——— = tie-point temperature

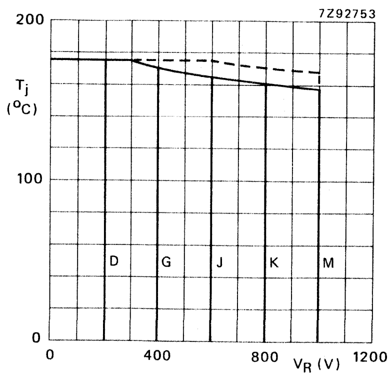


Fig. 6 Maximum permissible junction temperature as a function of reverse voltage;
——— = V_R; -------- = V_{RWM}, $\delta = 0,5$.

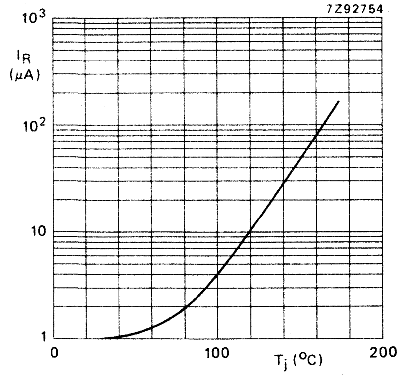


Fig. 7 Maximum values reverse current as a function of junction temperature; $V_R = V_{RWMmax}$.

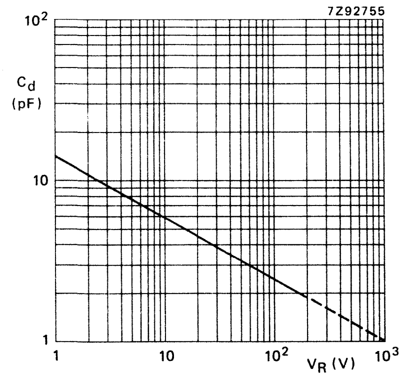
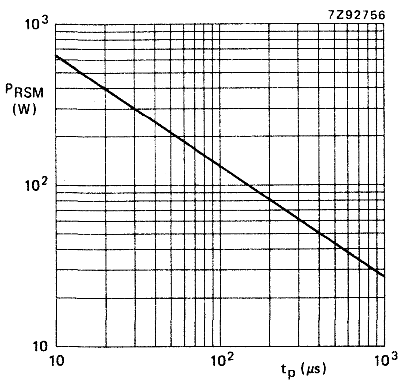


Fig. 8 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.



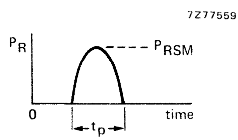


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region; $T_j = T_j$ max.

AVALANCHE FAST SOFT-RECOVERY RECTIFIER DIODES

Rectifier diodes in hermetically sealed axial-leaded ID* envelopes. They are intended for television and industrial applications, such as switched-mode power supplies, scan rectifiers in TV receivers and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy e.g. during flashover in the picture tube).

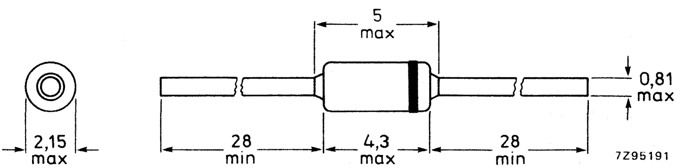
QUICK REFERENCE DATA

			BDY33D	G	J	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V
Average forward current	$I_{F(AV)}$	max.		1,3		A
Non-repetitive peak forward current	I_{FSM}	max.		20		A
Non-repetitive peak reverse energy	E_{RSM}	max.		10		mJ
Reverse recovery time	t_{rr}	<		250		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-81.



The marking band indicates the cathode.

* Implosion diode.

RATINGS

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

			BYD33D	G	J	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V
Average forward current (averaged over any 20 ms period)						
T_{tp} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.		1,3		A
T_{amb} = 65 °C; see Fig. 2	$I_{F(AV)}$	max.		0,7		A
Repetitive peak forward current						
T_{tp} = 55 °C; see Fig. 10	I_{FRM}	max.		12		A
T_{amb} = 65 °C; see Fig. 11	I_{FRM}	max.		7		A
Non-repetitive peak forward current t = 10 ms, half-sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRM\,max}$	I_{FSM}	max.		20		A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$, prior to surge; with inductive load switched off	E_{RSM}	max.		10		mJ
Storage temperature	T_{stg}			−65 to + 175		°C
Junction temperature	T_j	max.		175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	60	K/W
2. Thermal resistance from junction to ambient; device mounted on an 1,5 mm thick epoxy-glass printed circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal Model")	$R_{th\,j\text{-}a}$	=	120	K/W

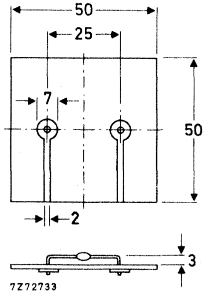


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified			BYD33D	G	J	
Forward voltage*						
I_F = 1 A	V_F	<	1,3	1,3	1,3	V
I_F = 1 A; $T_j = T_{j\,max}$	V_F	<	1,1	1,1	1,1	V
Reverse avalanche breakdown voltage						
I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	V
Reverse current						
$V_R = V_{RRM\,max}$**	I_R	<		1		μA
$V_R = V_{RRM\,max}$; T_j = 165 °C	I_R	<		100		μA
Reverse recovery when switched from I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 20 A/μs						
recovery charge	Q_s	<		250		nC
recovery time	t_{rr}	<		250		ns
Maximum slope of reverse recovery current when switched from I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 1 A/μs	$\|dI_R/dt\|$	<		6		A/μs

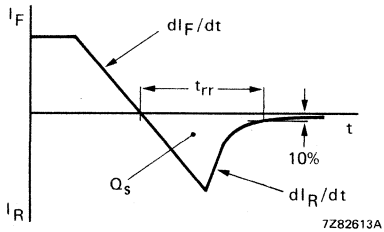


Fig. 3 Definitions of t_{rr}, Q_s and dI_R/dt.

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

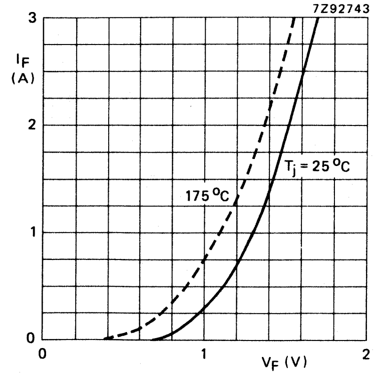


Fig. 4 Maximum forward voltage.

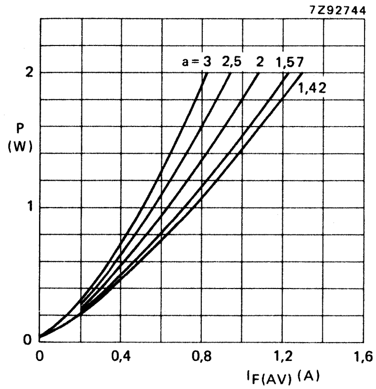
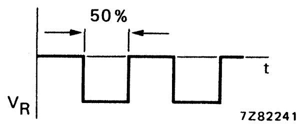


Fig. 5 Maximum values steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\,max}$.



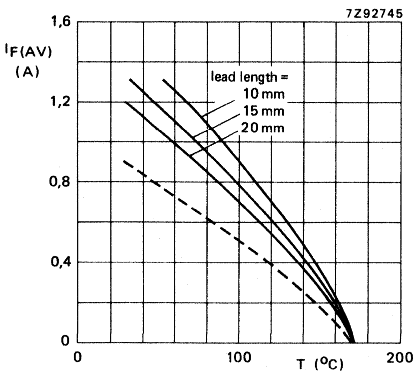


Fig. 6 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application.

$V_R = V_{RRM\,max}$, $\delta = 0{,}5$; a = 1,42.

– – – = ambient temperature and device mounted as shown in Fig. 2

——— = tie-point temperature

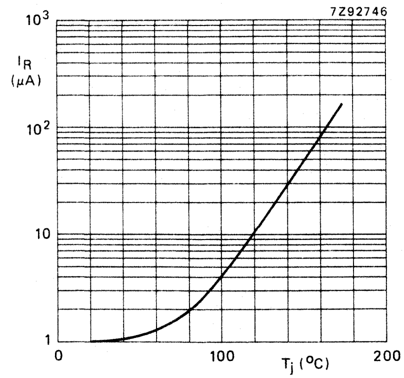


Fig. 7 Maximum values reverse current as a function of junction temperature; $V_R = V_{RRM\,max}$.

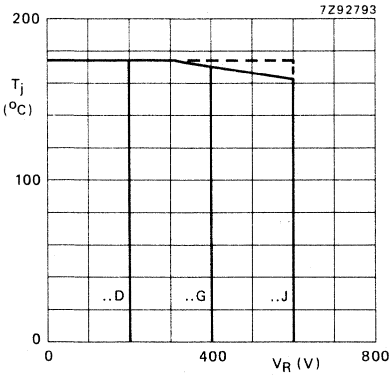


Fig. 8 Maximum permissible junction temperature as a function of reverse voltage;
—— = V_R; – – – = V_{RRM}, δ = 0,5.

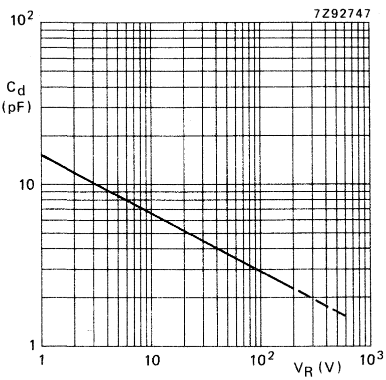


Fig. 9 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

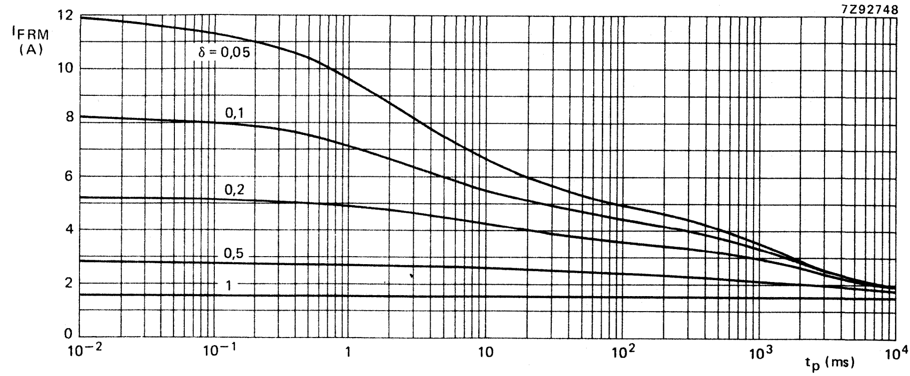


Fig. 10 Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 60 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

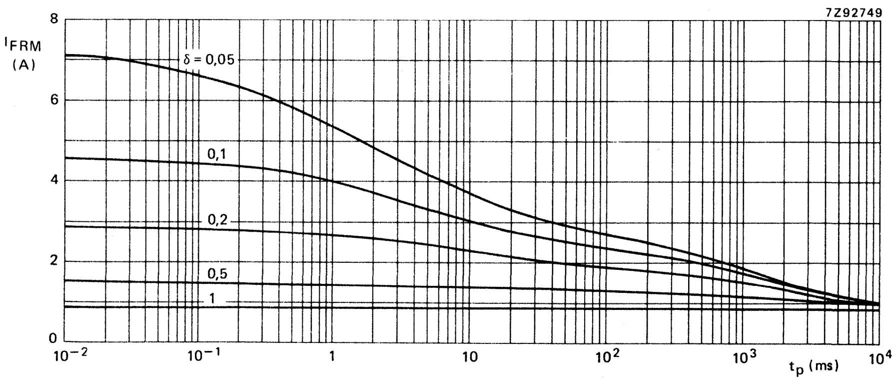


Fig. 11 Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 120 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

EPITAXIAL AVALANCHE DIODES

Rectifier diodes in hermetically sealed axial-leaded ID*-envelopes. They feature low forward voltage drop, very fast recovery, very low stored charge, non-snap-off switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in a picture tube). These properties make the diodes very suitable for use in switched-mode power supplies and in general high-frequency circuits, where low conduction and switching losses are essential.

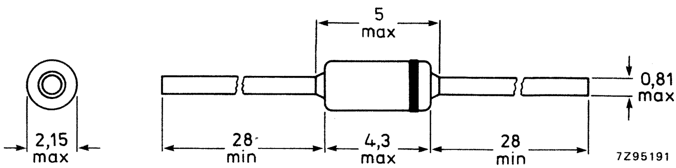
QUICK REFERENCE DATA

		BYD73	A	B	C	D	E	F	G	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	250	300	400	V
Continuous reverse voltage	V_R	max.	50	100	150	200	250	300	400	V
Average forward current	$I_{F(AV)}$	max.	1,75	1,75	1,75	1,75	1,7	1,7	1,7	A
Non-repetitive peak forward current	I_{FSM}	max.	25	25	25	25	25	25	25	A
Non-repetitive peak reverse energy	E_{RSM}	max.	20	20	20	20	20	20	20	mJ
Reverse recovery time	t_{rr}	<	25	25	25	25	50	50	50	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-81



The marking band indicates the cathode.

* Implosion diode.

RATINGS

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

			BYD73 A	B	C	D	E	F	G	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	250	300	400	V
Continuous reverse voltage	V_R	max.	50	100	150	200	250	300	400	V
Average forward current										
square wave; δ = 0,5										
T_{tp} = 55 °C; lead length = 10 mm	$I_{F(AV)}$	max.	1,75	1,75	1,75	1,75	1.7	1,7	1,7	A
T_{amb} = 60 °C; Fig. 2	$I_{F(AV)}$	max.	1	1	1	1	0,95	0,95	0,95	A
Repetitive peak forward current	I_{FRM}	max.	15	15	15	15	13	13	13	A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	I_{FSM}	max.			25					A
Non-repetitive peak reverse avalanche energy; with inductive load switched off:										
I_R = 600 mA at T_j = 25 °C prior to surge	E_{RSM}	max.			20					mJ
I_R = 400 mA at $T_j = T_{j\,max}$ prior to surge	E_{RSM}	max.			10					mJ
Storage temperature	T_{stg}				−65 to +175					°C
Junction temperature	T_j	max.			175					°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\,j\text{-}tp}$ = 60 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm (see "Thermal Model") — $R_{th\,j\text{-}a}$ = 120 K/W

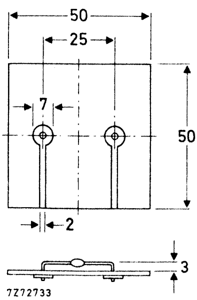


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD73 A	B	C	D	E	F	G	
Reverse avalanche breakdown voltage I_R = 0,1 mA	$V_{(BR)R}$	>	55	110	165	220	275	330	440	V
Forward voltage* I_F = 1 A; $T_j = T_{j\,max}$	V_F	<	0,74	0,74	0,74	0,74	0.83	0,83	0,83	V
I_F = 1 A	V_F	<	0,95	0,95	0,95	0,95	1,05	1,05	1,05	V
Reverse current $V_R = V_{RRMmax}$; T_j = 25 °C	I_R	<	1	1	1	1	1	1	1	µA
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<	100	100	100	100	100	100	100	µA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A. For definition see Figs 3 and 4	t_{rr}	<	25	25	25	25	50	50	50	ns

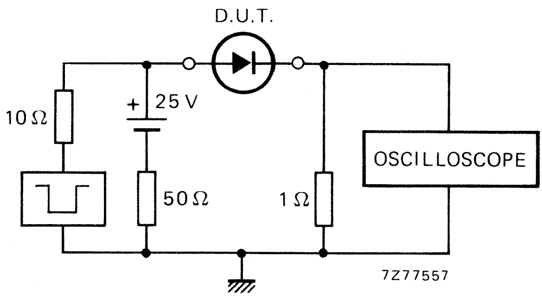


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ⩽ 7 ns.
Source impedance 50 Ω. Rise time ⩽ 15 ns.

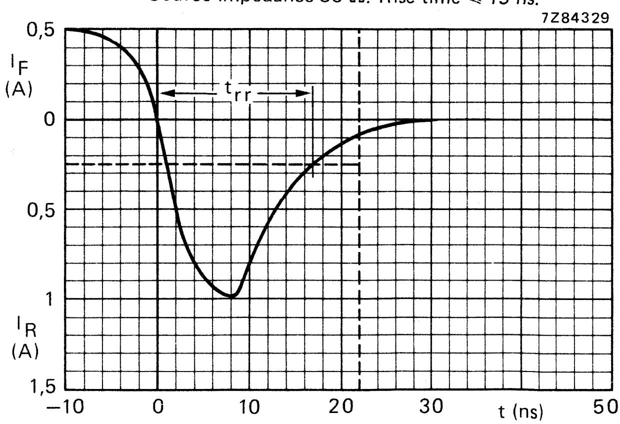


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

CONTROLLED AVALANCHE RECTIFIER DIODES

Double-diffused glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes, capable of absorbing reverse transients.

They are intended for rectifier applications in television circuits as well as general purpose applications e.g. in telephony equipment.

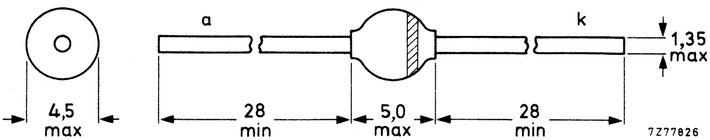
QUICK REFERENCE DATA

			BYM56A	B	C	D	E	
Crest working reverse voltage	V_{RWM}	max.	200	400	600	800	1000	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	225	450	650	900	1100	V
		<	1600	1600	1600	1600	1600	V
Average forward current	$I_{F(AV)}$	max.			3,5			A
Non-repetitive peak forward current	I_{FSM}	max.			80			A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.			1			kW
Junction temperature	T_j	max.			175			°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

			BYM56A	B	C	D	E	
Crest working reverse voltage	V_{RWM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V

Average forward current (averaged over any 20 ms period)				
T_{tp} = 50 °C, lead length 10 mm	$I_{F(AV)}$	max.	3,5	A
T_{amb} = 55 °C; Fig. 2	$I_{F(AV)}$	max.	1,4	A
Repetitive peak forward current	I_{FRM}	max.	20	A
Non-repetitive peak forward current t = 10 ms; half sine-wave; $T_j = T_{j\ max}$ prior to surge; $V_R = V_{RWMmax}$	I_{FSM}	max.	80	A
Non-repetitive peak reverse power dissipation t = 20 µs (half sine-wave) $T_j = T_{j\ max}$ prior to surge	P_{RSM}	max.	1	kW
Non-repetitive peak reverse avalanche energy; I_R = 1 A; $T_j = T_{j\ max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	20	mJ
Storage temperature	T_{stg}		−65 to + 175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	25	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ≥ 40 µm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	75	K/W

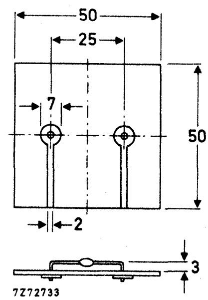


Fig. 2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYM56A	B	C	D	E	
Forward voltage*								
I_F = 5 A	V_F	<	1,25	1,25	1,25	1,25	1,25	V
I_F = 3 A; $T_j = T_{j\,max}$	V_F	<	0,95	0,95	0,95	0,95	0,95	V
Reverse avalanche breakdown voltage								
I_R = 0,1 mA	$V_{(BR)R}$	>	225	450	650	900	1100	V
		<	1600	1600	1600	1600	1600	V
Reverse current								
$V_R = V_{RWMmax}$**	I_R	<			1			μA
$V_R = V_{RWMmax}$; T_j = 165 °C	I_R	<			150			μA
Diode capacitance								
V_R = 0; f = 1 MHz	C_d	typ.			90			pF

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

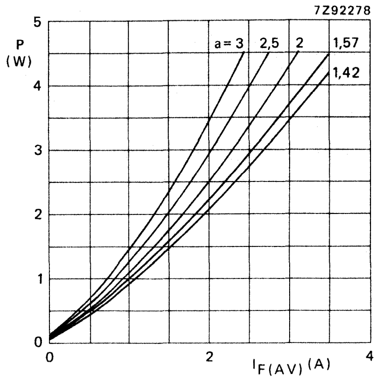


Fig. 3 Steady state power dissipation (forward plus leakage current) excluding losses in avalanche region as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; V_{RWMmax}.

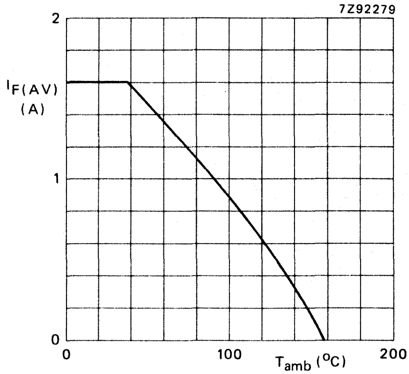


Fig. 4 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

$a = 1,57$; $V_R = V_{RWMmax}$.

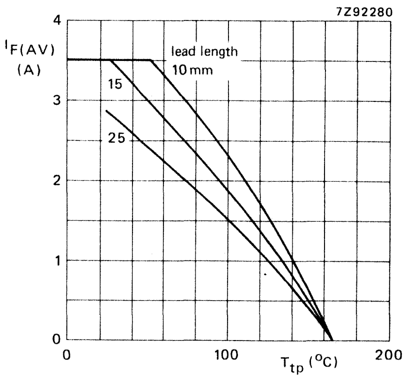


Fig. 5 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$; $a = 1,57$.

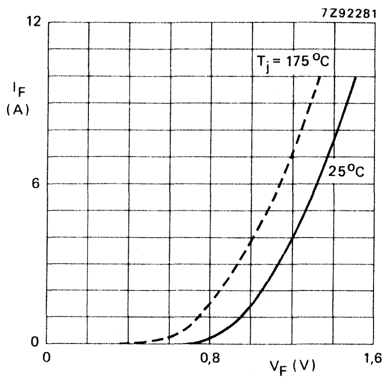


Fig. 6 Maximum V_F curves.

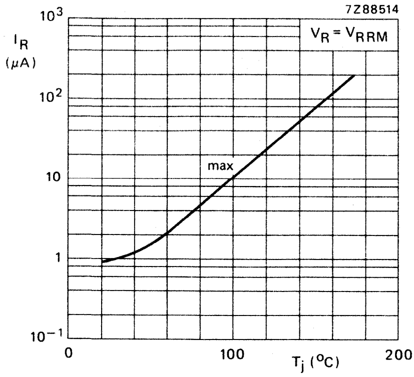


Fig. 7 I_R vs. T_j.

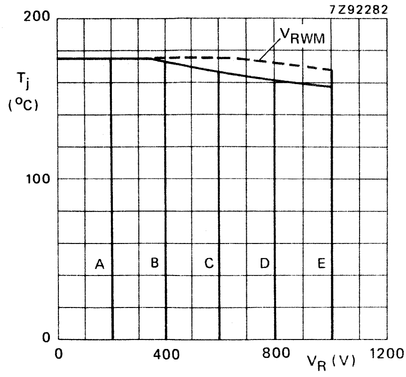


Fig. 8 Maximum values of T_j vs. V_R.

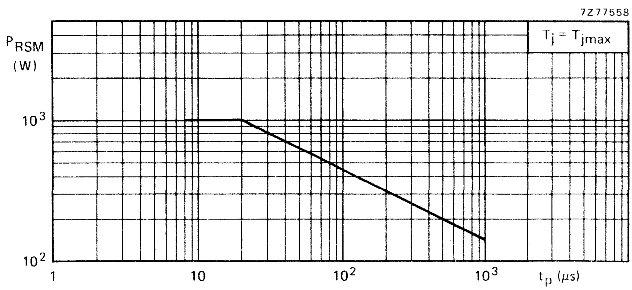
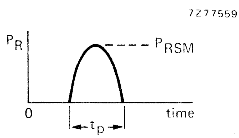


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



SCHOTTKY BARRIER DIODE

Schottky barrier diode with an integrated p-n junction protection ring in a DO-41 glass envelope and intended for use in low output voltage, low-power switch-mode power supplies and, in general, in circuits, where low forward voltage values are important.

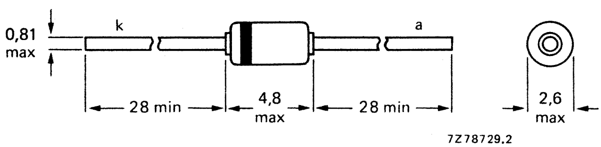
This diode is available in three reverse-voltage groups.

QUICK REFERENCE DATA

			BYV10-20	-30	-40	
Repetitive peak reverse voltage	V_{RRM}	max.	20	30	40	V
Reverse current	I_R	<		1		mA
Average forward current (d.c.)	$I_{F(AV)}$	max.		1		A
Forward voltage $I_F = 1$ A	V_F	<		0,55		V
Reverse recovery time	t_{rr}	<		30		ns
Junction temperature	T_j	max.		125		°C

Fig. 1 DO-41 (SOD-66).

Dimensions in mm



The cathode is indicated by a coloured band.

RATINGS

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

			BYV10-20	-30	-40	
Repetitive peak reverse voltage	V_{RRM}	max.	20	30	40	V
at T_{amb} = . . .		max.	100	75	50	°C
Average forward current (d.c.)	$I_{F(AV)}$	max.		1		A
Storage temperature	T_{stg}			−65 to + 200		°C
Operating junction temperature	T_j			−65 to + 125		°C

THERMAL RESISTANCE

From junction to tie-point at 4 mm from the body	$R_{th\ j\text{-}tp}$	110	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage				
I_F = 0,1 A		<	0,39	V
I_F = 1 A	V_F	<	0,55	V
I_F = 3 A		<	0,85	V
Reverse current				
$V_R = V_{RRM}$	I_R	<	1	mA
Diode capacitance				
f = 1 MHz; V_R = 0	C_d	typ.	220	pF
Reverse recovery time when switched from I_F = 200 mA to I_R = 200 mA; R_L = 100 Ω; measured at I_R = 20 mA	t_{rr}	<	30	ns

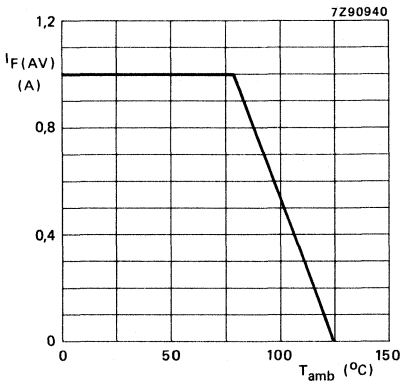


Fig. 2 Derating curve maximum ambient temperature.

VERY FAST SOFT-RECOVERY AVALANCHE RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. They are intended for use in switched-mode power supplies and high-frequency inverter circuits. In general, they are used where high output voltages and low switching losses are essential. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy.

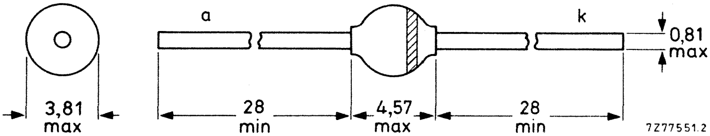
QUICK REFERENCE DATA

			BYV26A	26B	26C	26D	26E	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V
Average forward current	$I_{F(AV)}$	max.	1	1	1	1	1	A
Non-repetitive peak forward current	I_{FSM}	max.	20	20	20	20	20	A
Non-repetitive peak reverse energy	E_{RSM}	max.	10	10	10	10	10	mJ
Reverse recovery time	t_{rr}	<	30	30	30	75	75	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

			BYV26A	26B	26C	26D	26E	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V

Average forward current averaged over any 20 ms period				
T_{tp} = 85 °C; lead length 10 mm	$I_{F(AV)}$	max.	1	A
T_{amb} = 60 °C; see Fig. 2	$I_{F(AV)}$	max.	0,65	A
Repetitive peak forward current; see Figs 11 and 12	I_{FRM}	max.	10	A
Non-repetitive peak forward current t = 10 ms; half-sinewave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	I_{FSM}	max.	20	A
Non-repetitive peak reverse avalanche energy I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	10	mJ
Storage temperature	T_{stg}		−65 to + 175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient; device mounted on an 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness > 40 μm; Fig. 2 (see „thermal model")	$R_{th\,j\text{-}a}$	=	100	K/W

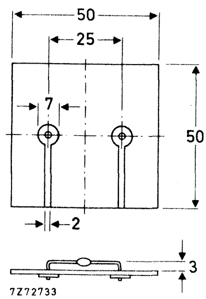


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYV26A	26B	26C	26D	26E	
Forward voltage*								
I_F = 1 A; T_j = 175 °C	V_F	<	1,3	1,3	1,3	1,3	1,3	V*
I_F = 1 A	V_F	<	2,5	2,5	2,5	2,5	2,5	V
Reverse avalanche breakdown voltage								
I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	900	1100	V
Reverse current								
$V_R = V_{RRMmax}$ **	I_R	<	1	1	1	1	1	μA**
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<	150	150	150	150	150	μA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A for definition see Figs 3 and 4	t_{rr}	<	30	30	30	75	75	ns

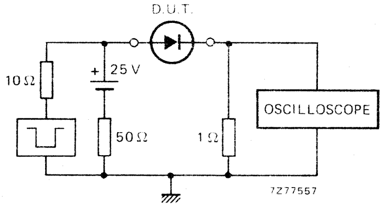


Fig. 3 Test circuit. Input impedance oscilloscope: 1 MΩ; 22 pF; rise time < 7 ns. Source impedance: 50 Ω; rise time < 15 ns.

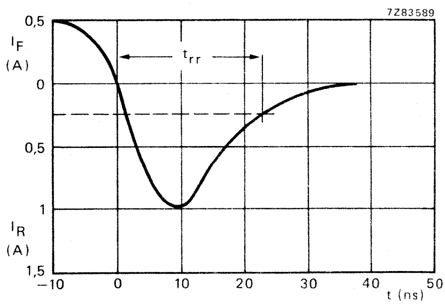


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

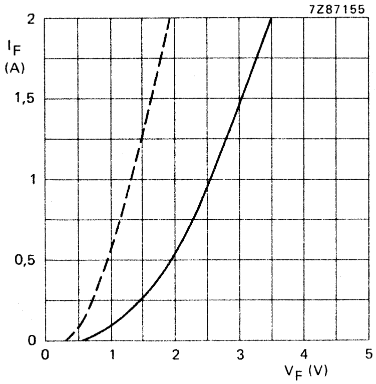
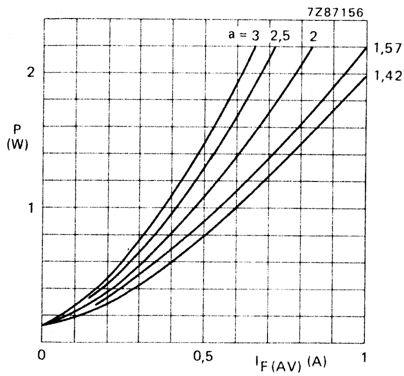


Fig. 5 Maximum forward voltage at
—— T_j = 25 °C
– – – T_j = 175 °C.



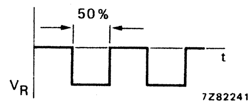


Fig. 6 Maximum steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$;

$V_R = V_{RRMmax}$, δ = 0,5.

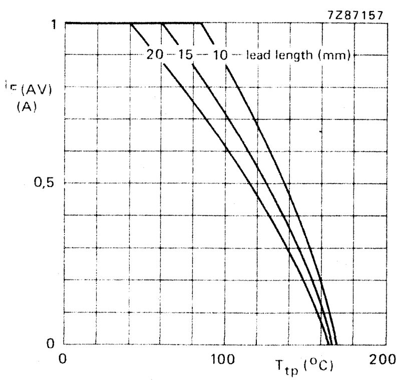


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application. $V_R = V_{RRMmax}$, δ = 0,5; a = 1,42.

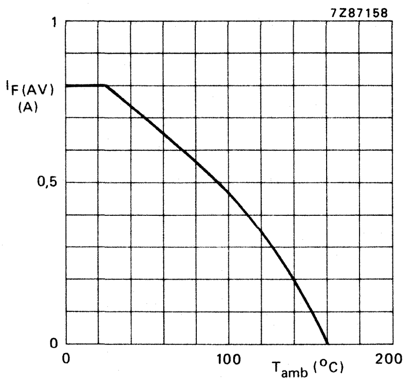


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2. The graph is for switched-mode application. $V_R = V_{RRMmax}$, $\delta = 0,5$; a = 1,42.

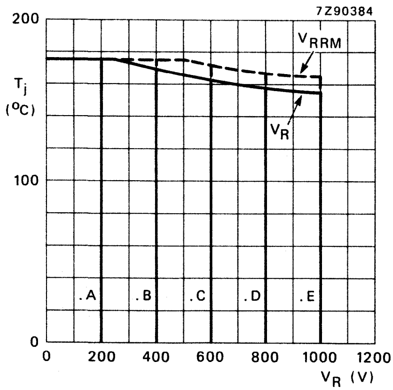


Fig. 9 Maximum permissible junction temperature as a function of the applied reverse voltage.

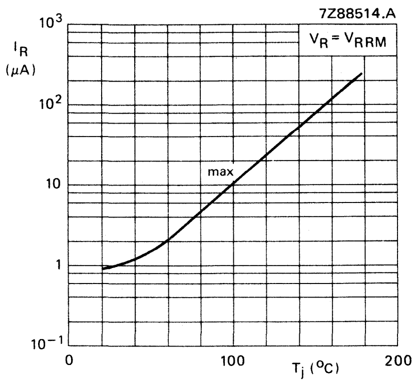


Fig. 10 Reverse current as a function of junction temperature. $V_R = V_{RRM}$.

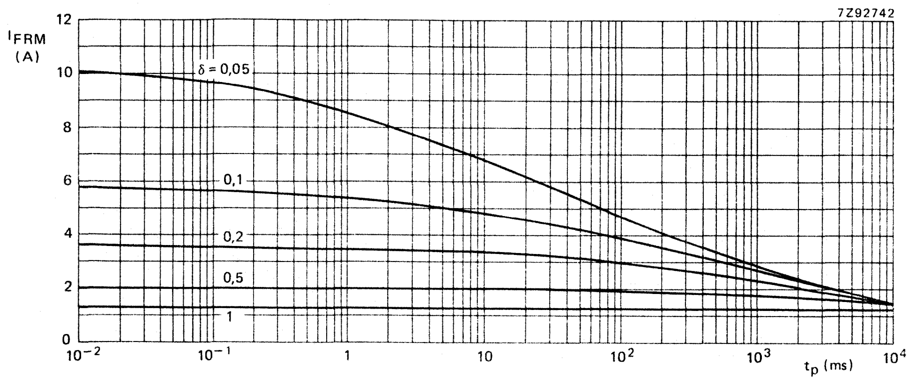


Fig. 11 Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{tp} = 85 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during 1 - δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

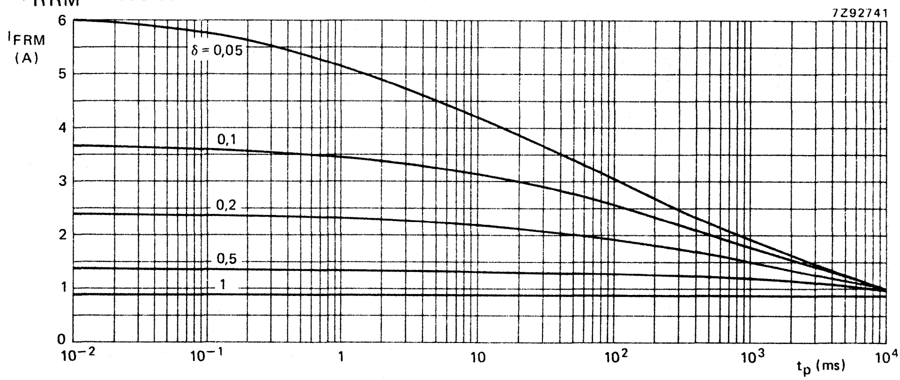


Fig. 12 Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during 1 - δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

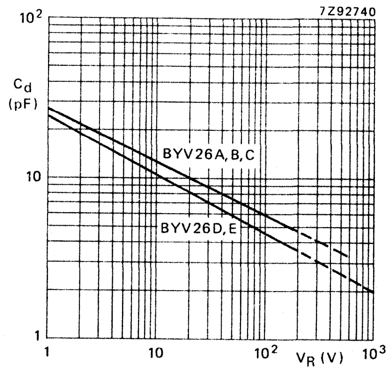


Fig. 13 Capacitance versus reverse voltage; typical values.

EPITAXIAL AVALANCHE DIODES

Glass passivated epitaxial rectifier diodes in hermetically sealed axial-leaded glass envelopes. They feature low forward voltage drop, very fast recovery, very low stored charge, non-snap-off switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in a picture tube). These properties make the diodes very suitable for use in switched-mode power supplies and in general high-frequency circuits, where low conduction and switching losses are essential.

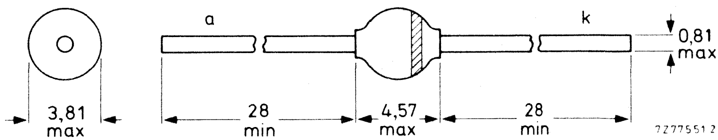
QUICK REFERENCE DATA

			BYV27-50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Average forward current	$I_{F(AV)}$	max.		2			A
Non-repetitive peak reverse energy	E_{RSM}	max.		40			mJ
Reverse recovery time	t_{rr}	<		25			ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

			BYV27-50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Continuous reverse voltage	V_R	max.	50	100	150	200	V

Average forward current (switching losses negligible up to 200 kHz) square wave; $\delta = 0,5$				
$T_{tp} = 85\ ^{o}C$; lead length = 10 mm	$I_{F(AV)}$	max.	2	A
$T_{amb} = 60\ ^{o}C$; Fig. 2	$I_{F(AV)}$	max.	1,3	A
Repetitive peak forward current	I_{FRM}	max.	15	A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	I_{FSM}	max.	50	A
Non-repetitive peak reverse avalanche energy; I_R = 600 mA; prior to surge; with inductive load switched off:				
→ at $T_j = 25\ ^{o}C$, prior to surge	E_{RSM}	max.	40	mJ
at $T_j = T_{j\,max}$, prior to surge	E_{RSM}	max.	20	mJ
Storage temperature	T_{stg}		−65 to + 175	^{o}C
Junction temperature	T_j	max.	175	^{o}C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2	$R_{th\,j\text{-}a}$	=	100	K/W

→ (see "Thermal model")

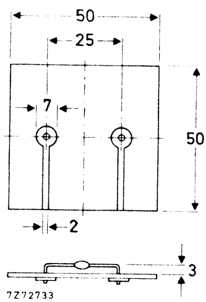


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYV27-50	100	150	200	
Reverse avalanche breakdown voltage I_R = 0,1 mA	$V_{(BR)R}$	>	55	110	165	220	V ←
Forward voltage* I_F = 3 A; $T_j = T_{j\,max}$	V_F	<		0,88			V
I_F = 3 A	V_F	<		1,07			V
Reverse current $V_R = V_{RRMmax}$	I_R	<		1			μA ←
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<		150			μA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A for definition see Figs 3 and 4	t_{rr}	<		25			ns

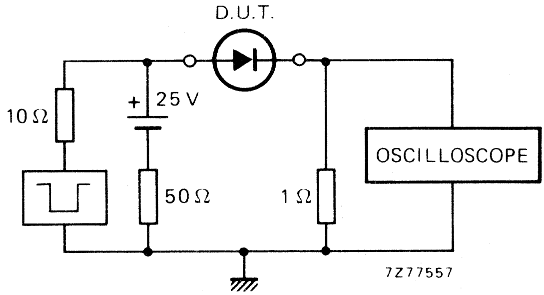


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ⩽ 7 ns.
Source impedance 50 Ω. Rise time ⩽ 15 ns.

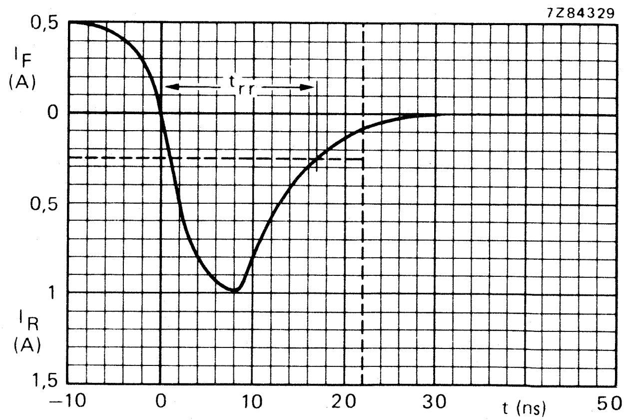


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

Reverse recovery when switched from
I_F = 1 A to $V_R \geq$ 30 V with
$-dI_F/dt$ = 20 A/μs (see Fig. 5)

recovered charge	Q_s	<	15 nC
recovery time	t_{rr}	<	50 ns

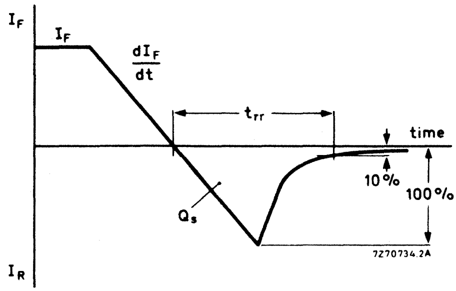


Fig. 5 Definitions of t_{rr} and Q_s.

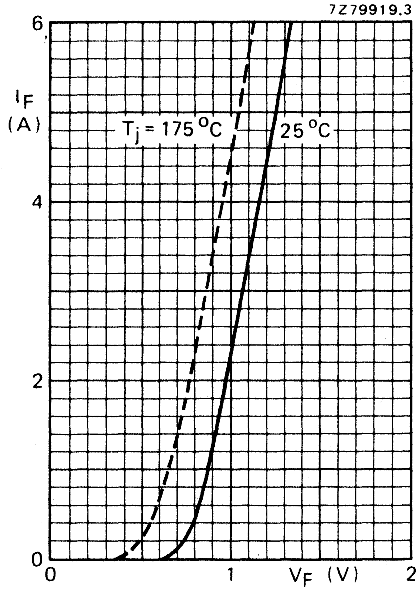


Fig. 6 Maximum forward voltage (V_F) curve.

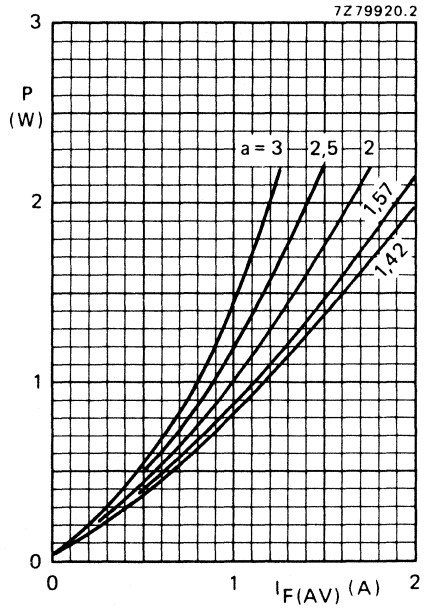


Fig. 7 $a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$.
Pulsed reverse voltage; δ = 0,5.
(Including reverse current losses and switching losses up to f = 200 kHz).

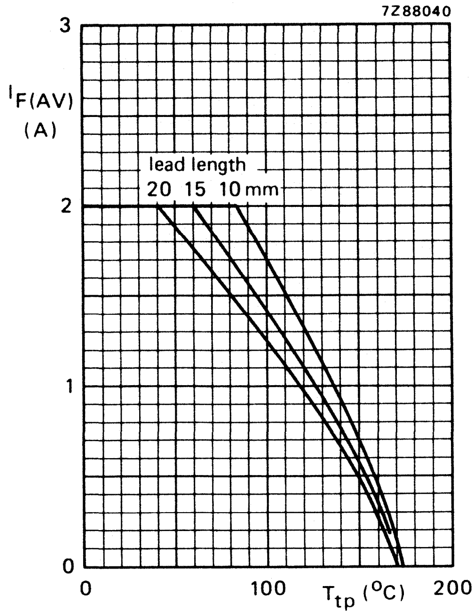


Fig. 8 Maximum average forward current.
The curves include losses due to reverse current and switching up to f = 200 kHz.
Pulsed reverse voltage, δ = 0,5.
$V_R = V_{RRMmax}$.
Square wave current, a = 1,42.

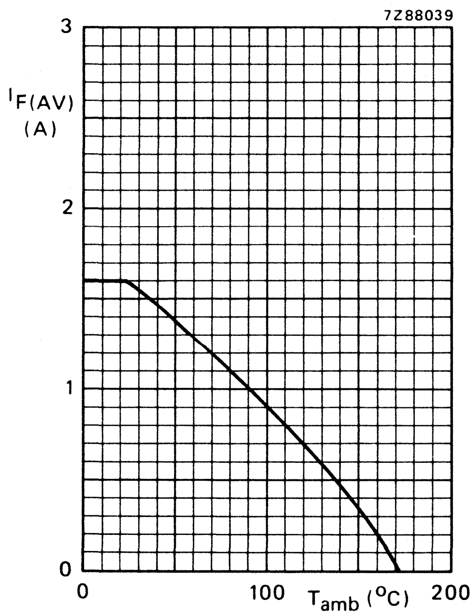


Fig. 9 Maximum average forward current.
The curve includes losses due to reverse current and switching up to f = 200 kHz.
Mounting method see Fig. 2.
Pulsed reverse voltage, δ = 0,5
$V_R = V_{RRMmax}$.
Square wave current, a = 1,42.

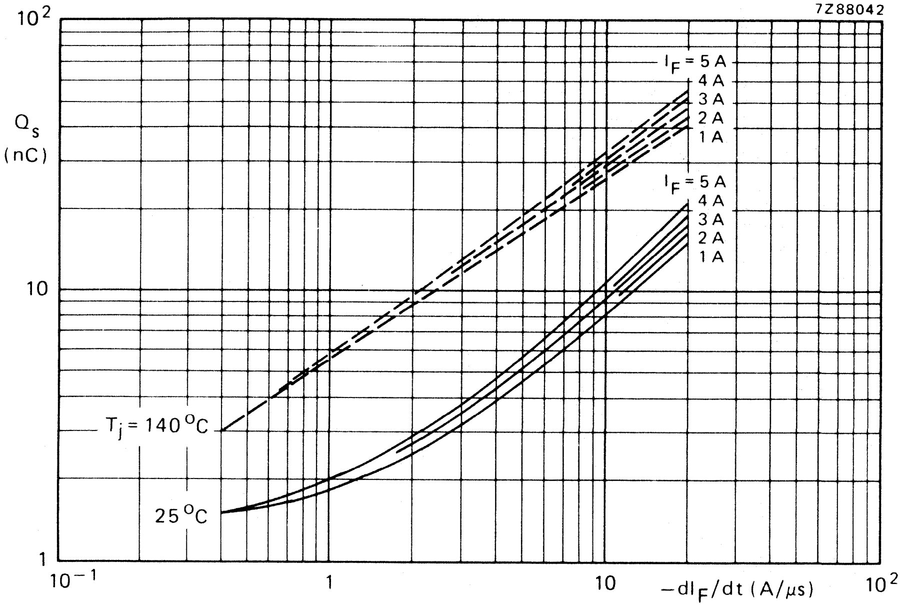


Fig. 10 Maximum values reverse recovery charge. For definition see Fig. 5.

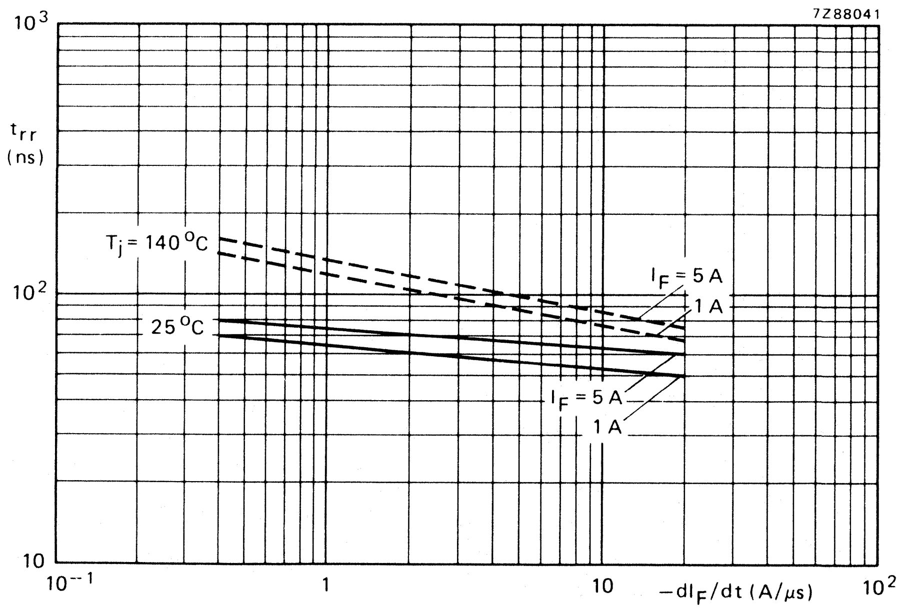


Fig. 11 Maximum values reverse recovery time. For definition see Fig. 5.

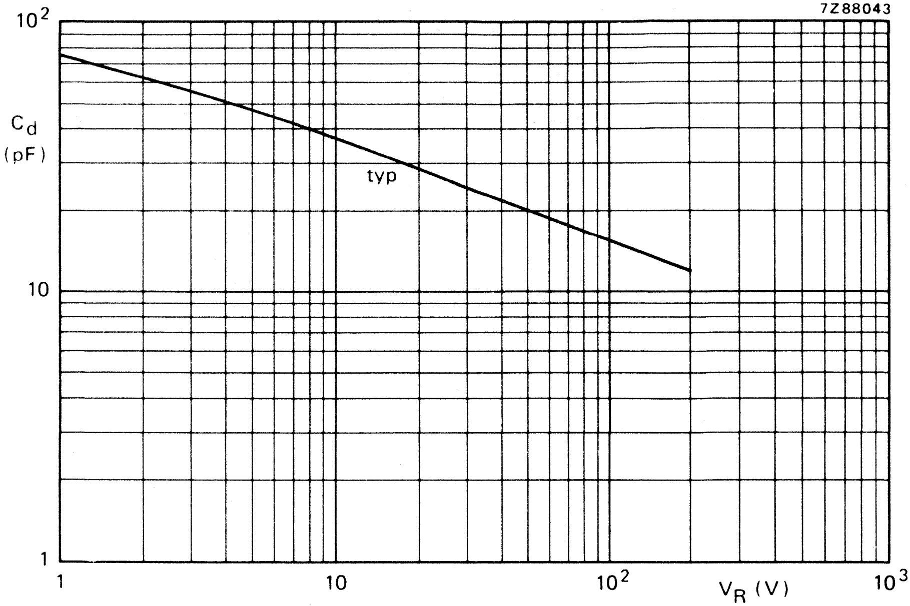


Fig. 12 Typical values diode capacitance at f = 1 MHz; T_j = 25 °C.

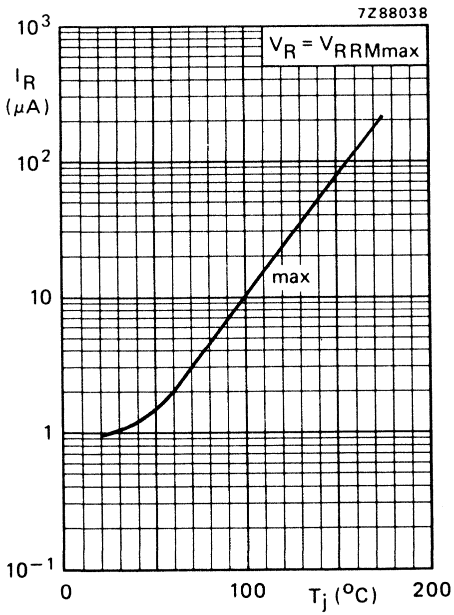


Fig. 13 Maximum values reverse current.

EPITAXIAL AVALANCHE DIODES

Glass passivated epitaxial rectifier diodes in hermetically sealed axial-leaded glass envelopes. They feature low forward voltage drop, very fast recovery, very low stored charge, non-snap-off switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in a picture tube). These properties make the diodes very suitable for use in switched-mode power supplies and in general in high-frequency circuits, where low conduction and switching losses are essential.

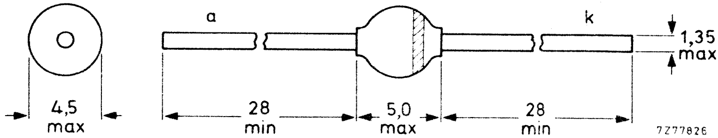
QUICK REFERENCE DATA

			BYV28-50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Average forward current	$I_{F(AV)}$	max.		3,5			A
Non-repetitive peak reverse energy	E_{RSM}	max.		40			mJ
Reverse recovery time	t_{rr}	<		30			ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

			BYV28-50	100	150	200	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	150	200	V
Continuous reverse voltage	V_R	max.	50	100	150	200	V
Average forward current (averaged over any 20 ms period)							
T_{tp} = 85 °C; lead length = 10 mm	$I_{F(AV)}$	max.			3,5		A
T_{amb} = 60 °C; p.c.b. mounting (see Fig. 2)	$I_{F(AV)}$	max.			1,9		A
Repetitive peak forward current	I_{FRM}	max.			25		A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	I_{FSM}	max.			90		A
Non-repetitive peak reverse avalanche energy; I_R = 600 mA; with inductive load switched off							
→ T_j = 25 °C, prior to surge	E_{RSM}	max.			40		mJ
$T_j = T_{j\,max}$, prior to surge	E_{RSM}	max.			20		mJ
Storage temperature	T_{stg}				−65 to +175		°C
Junction temperature	T_j	max.			175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\,j\text{-}tp}$ = 25 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 — $R_{th\,j\text{-}a}$ = 75 K/W
   → (see "Thermal model")

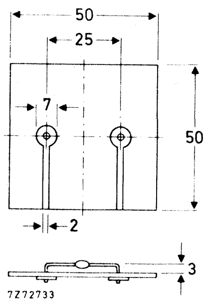


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C, unless otherwise specified

			BYV28-50	100	150	200	
Reverse avalanche breakdown voltage I_R = 0,1 mA	$V_{(BR)R}$	>	55	110	165	220	V
Forward voltage* I_F = 5 A;	V_F	<		1,10			V
I_F = 5 A; $T_j = T_{j\,max}$	V_F	<		0,89			V
Reverse current $V_R = V_{RRMmax}$	I_R	<		1			μA ←
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<		150			μA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A for definition see Figs 3 and 4	t_{rr}	<		30			ns

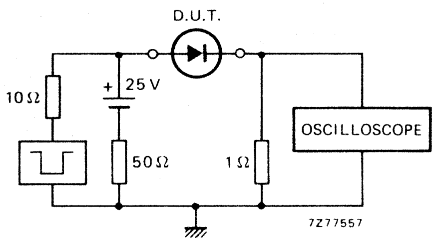


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF; Rise time ≤ 7 ns.
Source impedance 50 Ω. Rise time ≤ 15 ns.

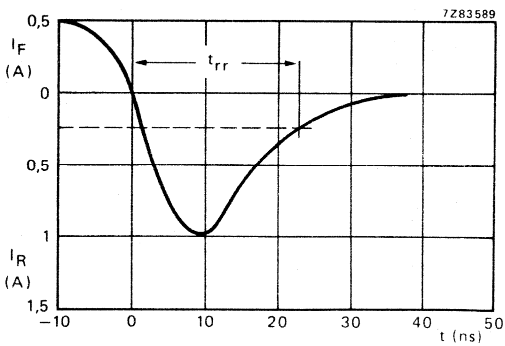


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

Reverse recovery when switched from
I_F = 1 A to $V_R \geqslant$ 30 V with
$-dI_F/dt$ = 20 A/μs (see Fig. 5)

recovered charge	Q_s	<	20 nC
recovery time	t_{rr}	<	50 ns

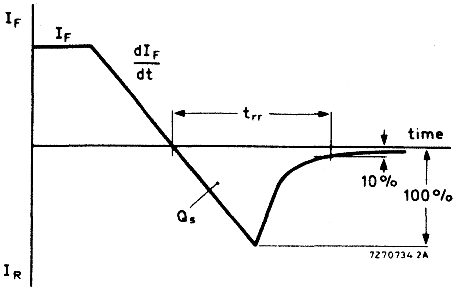


Fig. 5 Definitions of t_{rr} and Q_s.

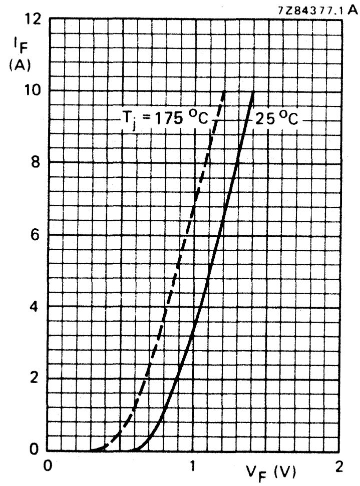


Fig. 6 Maximum forward voltage (V_F) curve.

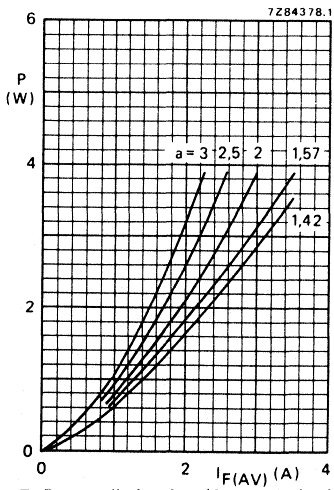


Fig. 7 Power dissipation (forward plus leakage current) as a function of the average forward current. Pulsed reverse voltage; δ = 50%.
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$.

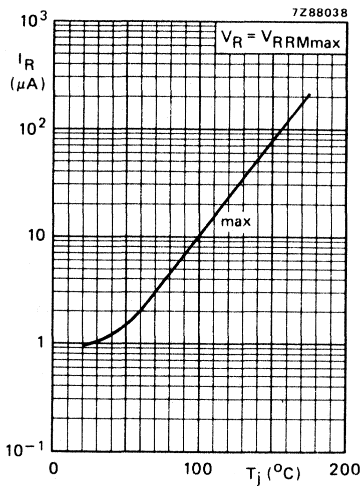


Fig. 8 Reverse current as a function of the junction temperature

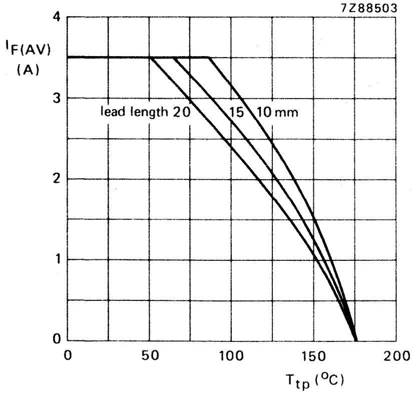


Fig. 9 Maximum average forward current. The curves include losses due to reverse current and switching up to f = 200 kHz.
Pulsed reverse voltage; δ = 0,5 V_R = $V_{RRM\,max}$.
Square-wave current; a = 1,42.

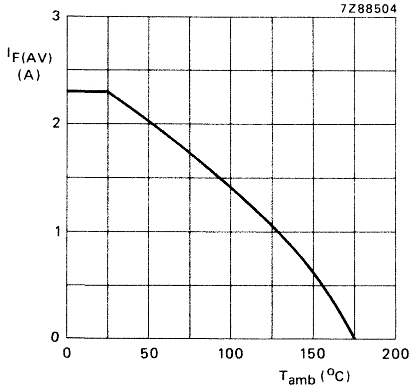


Fig. 10 Maximum average forward current. The curve includes losses due to reverse current and switching up to f = 200 kHz; mounting method see Fig. 2.
Pulsed reverse voltage; δ = 0,5 V_R = $V_{RRM\,max}$.
Square-wave current; a = 1,42.

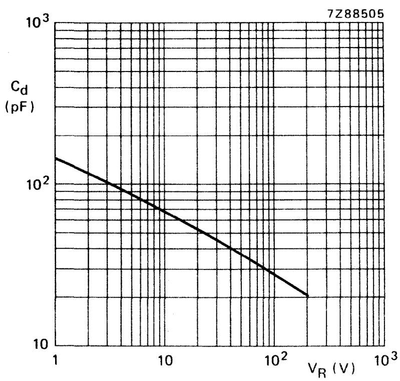


Fig. 11 Typical values diode capacitance at f = 1 MHz. T_j = 25 °C.

VERY FAST SOFT-RECOVERY AVALANCHE RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. The are intended for use in switched-mode power supplies and high-frequency inverter circuits. In general, they are used where high output voltages and low switching losses are essential. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy.

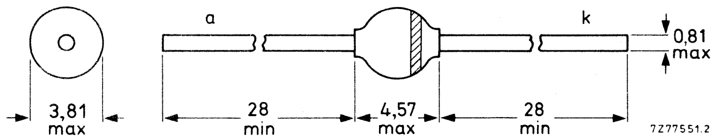
QUICK REFERENCE DATA

		BYV36	A	B	C	D	E	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V
Average forward current	$I_{F(AV)}$	max.	1,6	1,6	1,6	1,5	1,5	A
Non-repetitive peak forward current	I_{FSM}	max.	30	30	30	30	30	A
Non-repetitive peak reverse energy	E_{RSM}	max.	10	10	10	10	10	mJ
Reverse recovery time	t_{rr}	<	100	100	100	150	150	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

		BYV36	A	B	C	D	E	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	800	1000	V
Average forward current (averaged over any 20 ms period); T_{tp} = 60 °C; lead length 10 mm	$I_{F(AV)}$	max.	1,6	1,6	1,6	1,5	1,5	A
T_{amb} = 60 °C; see Fig. 2	$I_{F(AV)}$	max.	0,87	0,87	0,87	0,81	0,81	A
Repetitive peak forward current T_{tp} = 60 °C; see Figs 11, 12	I_{FRM}	max.	24	24	24	21	21	A
T_{amb} = 60 °C; see Figs 13, 14	I_{FRM}	max.	10	10	10	9	9	A

Non-repetitive peak forward current t = 10 ms, half sine-wave; $T_j = T_{j\,max}$ prior to surge $V_R = V_{RRMmax}$	I_{FSM}	max.	30	A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	10	mJ
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient; device mounted on an 1,5 mm thick epoxy-glass printed circuit board; Cu-thickness > 40 μm; Fig. 2 (see "Thermal Model")	$R_{th\,j\text{-}a}$	=	100	K/W

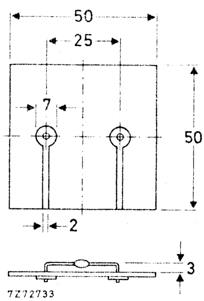


Fig. 2 Device mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYV36 A	B	C	D	E	
Forward voltage *								
I_F = 1 A	V_F	<	1,35	1,35	1,35	1,45	1,45	V
I_F = 1 A; T_j = 175 °C	V_F	<	1,00	1,00	1,00	1,05	1,05	V
Reverse avalanche breakdown voltage								
I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	900	1100	V
Reverse current								
$V_R = V_{RRMmax}$ **	I_R	<	1	1	1	1	1	μA
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<	150	150	150	150	150	μA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A (for definition see Figs 3 and 4)	t_{rr}	<	100	100	100	150	150	ns

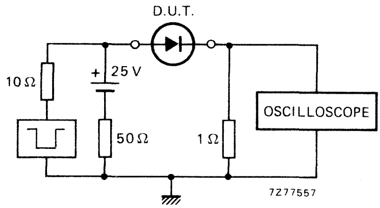


Fig. 3 Test circuit. Input impedance oscilloscope: 1 MΩ; 22 pF; rise time < 7 ns.
Source impedance: 50 Ω; rise time < 15 ns.

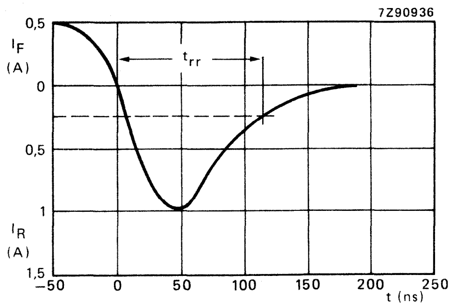


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

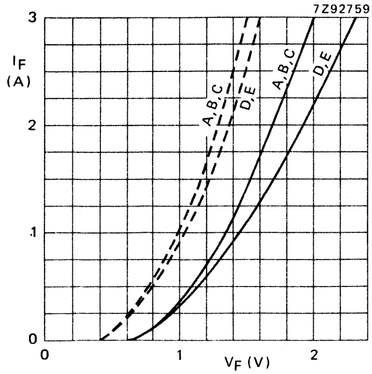


Fig. 5 Maximum forward voltage at
—— T_j = 25 °C; – – – T_j = 175 °C.

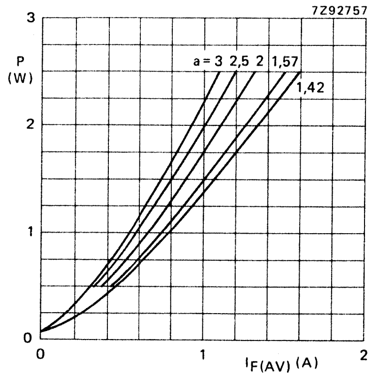
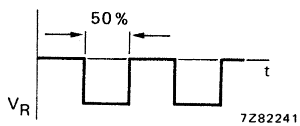


Fig. 6a **BYV36A; B; C.**

Conditions for Figs 6a and 6b:

Maximum steady state power dissipation (forward plus leakage current) excluding switching losses versus average forward current.
The graph is for switched-mode application.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$, δ = 0,5.



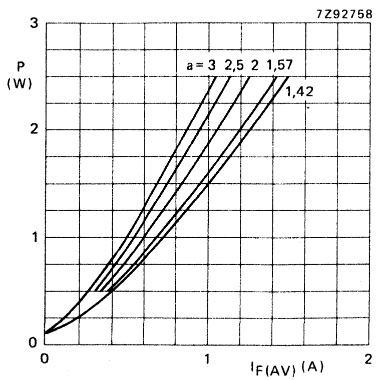


Fig. 6b **BYV36D; E.**

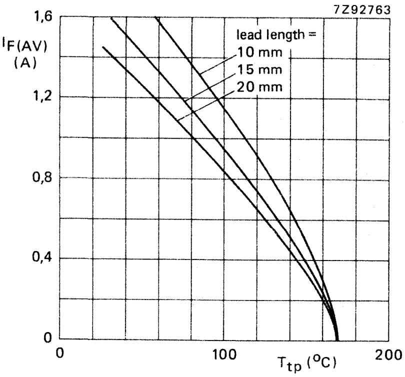


Fig. 7a **BYV36A; B; C.**

Conditions for Figs 7a and 7b:

Maximum average forward current versus tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application.
$V_R = V_{RRMmax}$, δ = 0,5; a = 1,42.

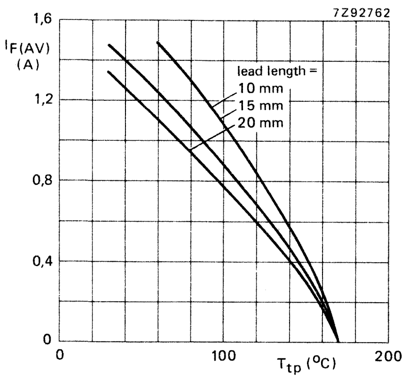


Fig. 7b **BYV36D; E.**

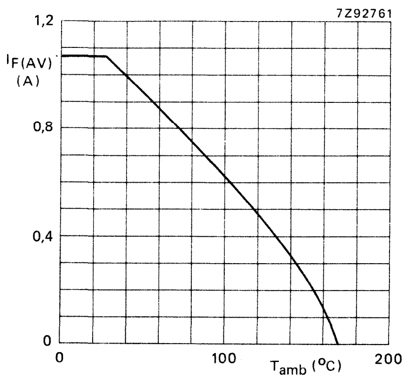


Fig. 8a **BYV36A; B; C.** Maximum average forward current versus ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application.
$V_R = V_{RRMmax}$, δ = 0,5; a = 1,42.

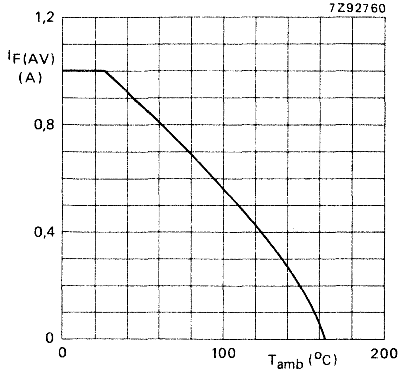


Fig. 8b **BYV36D; E**. Maximum average forward current versus ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application. $V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

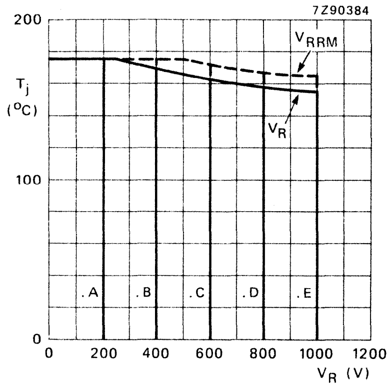


Fig. 9 Maximum permissible junction temperature versus applied reverse voltage.

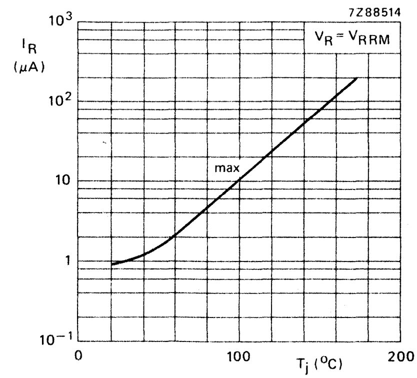


Fig. 10 Reverse current versus junction temperature. $V_R = V_{RRM}$.

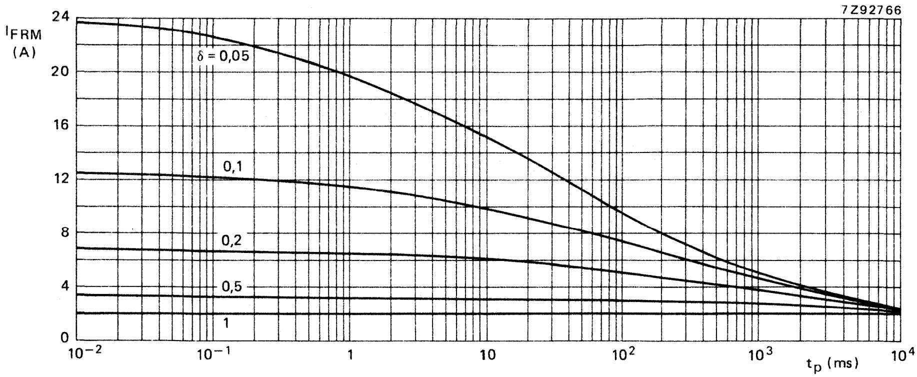


Fig. 11 **BYV36A; B; C**. Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at $T_{tie\text{-}point}$ = 60 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

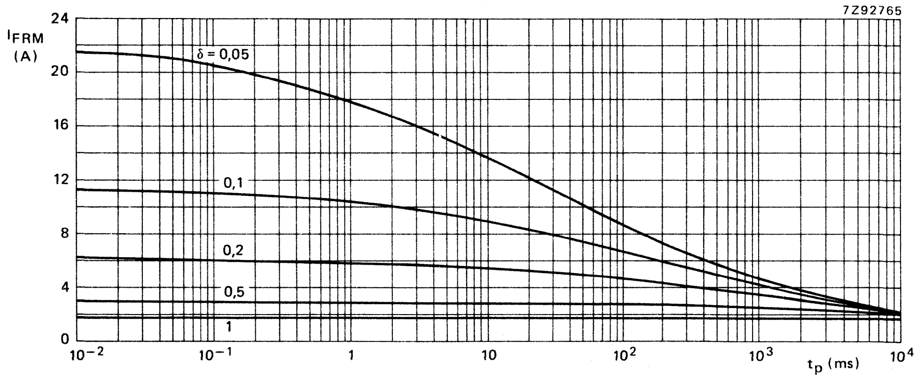


Fig. 12 **BYV36D; E**. Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at $T_{tie\text{-}point}$ = 60 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

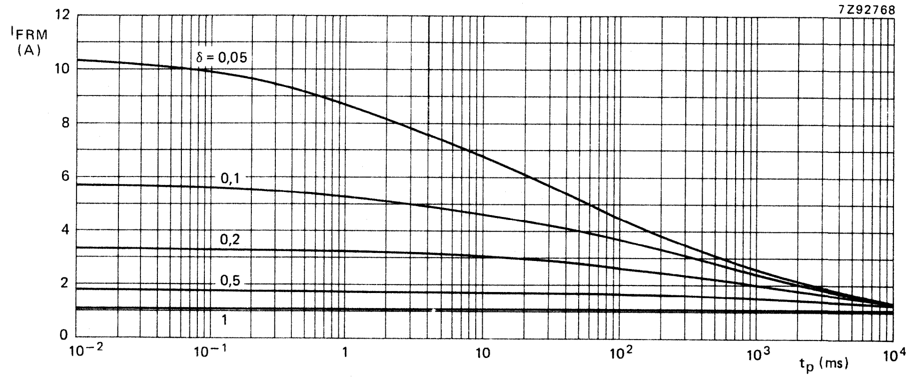


Fig. 13 **BYV36A; B; C**. Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

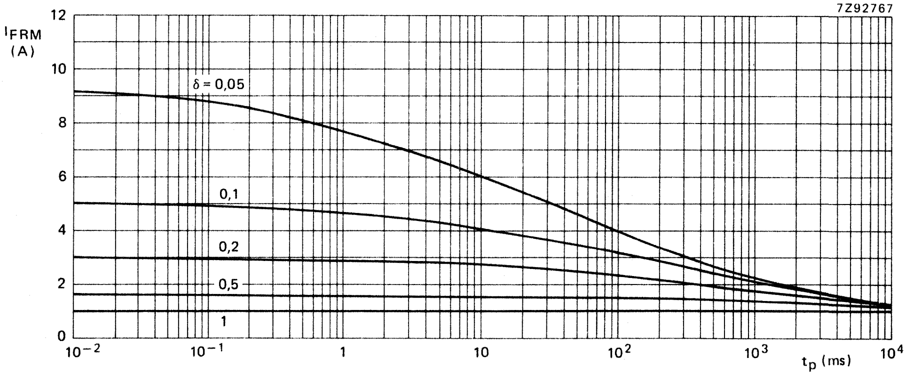


Fig. 14 **BYV36D; E**. Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

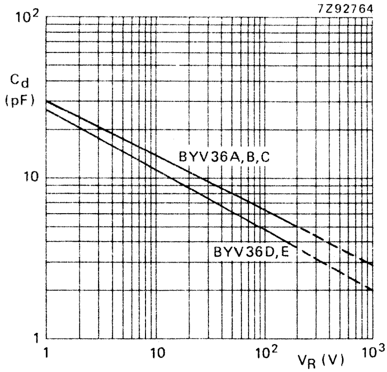


Fig. 15 Capacitance versus reverse voltage;
f = 1 MHz; T_j = 25 °C.

AVALANCHE FAST SOFT-RECOVERY RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. They are intended for television and industrial applications, such as switched-mode power supplies, scan rectifiers in TV receivers, and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in the picture tube).

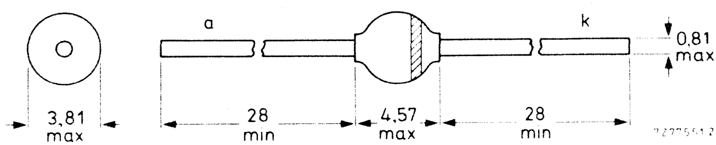
QUICK REFERENCE DATA

			BYV95A	B	C	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V
Average forward current	$I_{F(AV)}$	max.		1,5		A
Non-repetitive peak forward current	I_{FSM}	max.		35		A
Non-repetitive peak reverse energy	E_{RSM}	max.		10		mJ
Reverse recovery time	t_{rr}	<		250		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

			BYV95A	B	C	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V

Average forward current (averaged over any 20 ms period)				
T_{tp} = 65 °C; lead length 10 mm	$I_{F(AV)}$	max.	1,5	A
T_{amb} = 65 °C; Fig. 2	$I_{F(AV)}$	max.	0,8	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	I_{FSM}	max.	35	A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	10	mJ
Storage temperature	T_{stg}		−65 to + 175	°C
Operating junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 µm; Fig. 2 (see "Thermal model")	$R_{th\,j\text{-}a}$	=	100	K/W

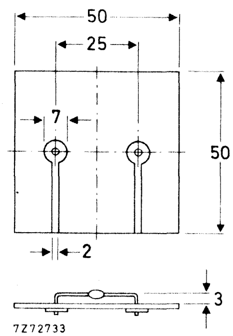


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYV95A	B	C	
Forward voltage						
I_F = 3 A	V_F	<	1,6	1,6	1,6	V *
I_F = 3 A; $T_j = T_{j\,max}$	V_F	<	1,35	1,35	1,35	V *
Reverse avalanche breakdown voltage						
I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	V
Reverse current						
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<		150		μA ←
Reverse recovery when switched from I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 20 A/μs						
recovered charge	Q_s	<		250		nC
recovery time	t_{rr}	<		250		ns
Maximum slope of reverse recovery current when switched from I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 1 A/μs	$\lvert dI_R/dt \rvert$	<		6		A/μs

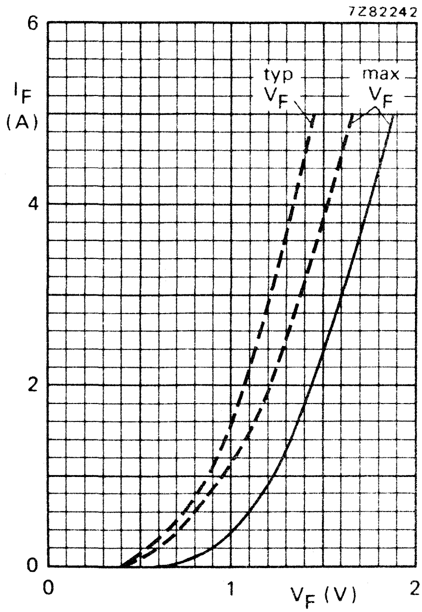


Fig. 3 —— T_j = 25 °C; – – – $T_j = T_{j\,max}$.

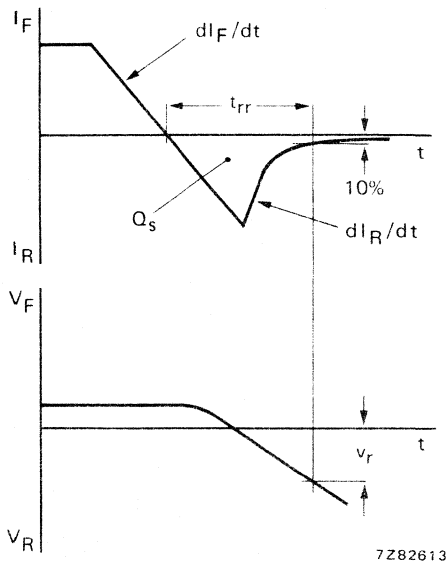


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

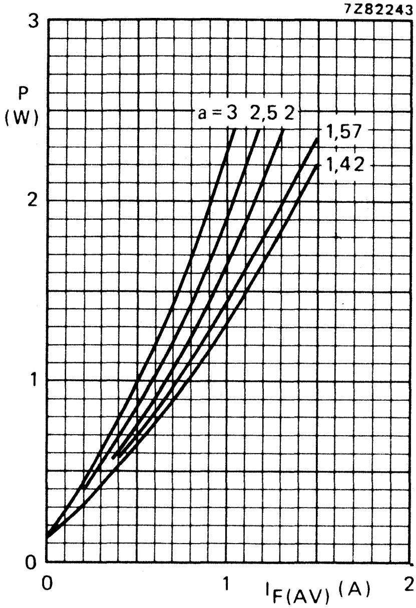
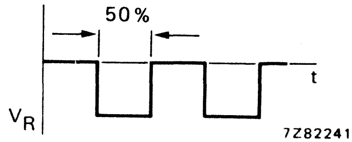


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$



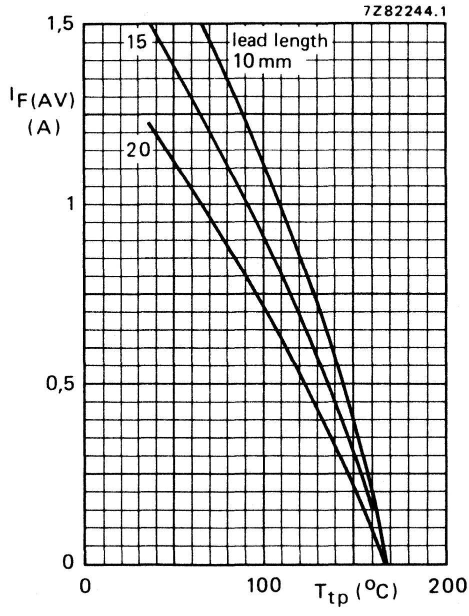


Fig. 6 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; $\delta = 50\%$; a = 1,57.

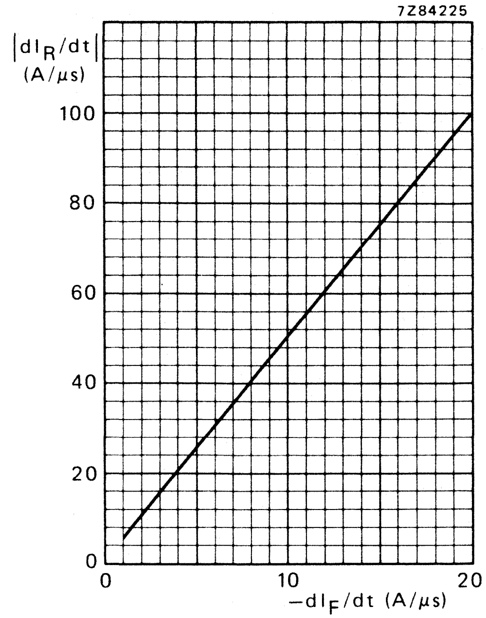


Fig. 7 Maximum slope of reverse recovery current. T_j = 25 °C

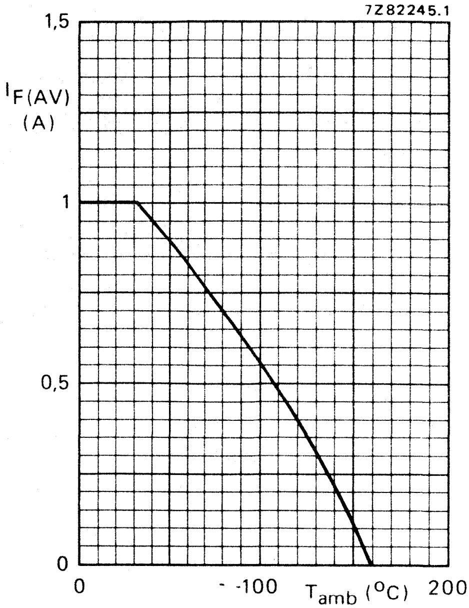


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.
The graph is for switched-mode application.
$V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

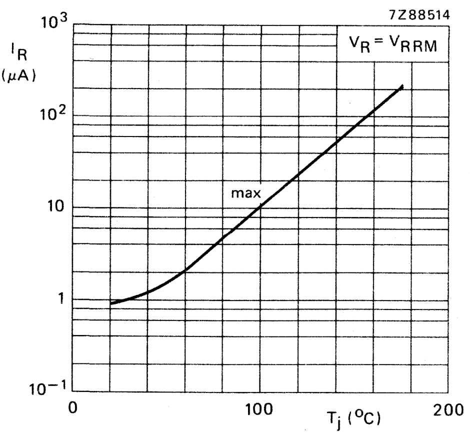


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM}$.

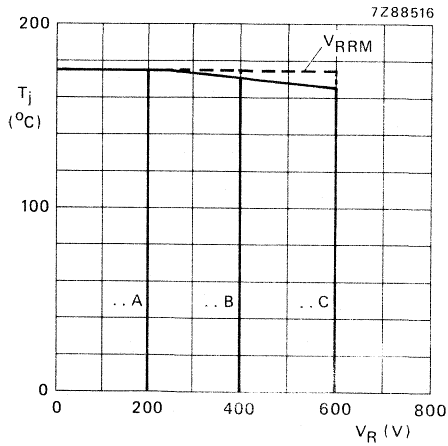


Fig. 10 Maximum junction temperature as a function of reverse voltage.

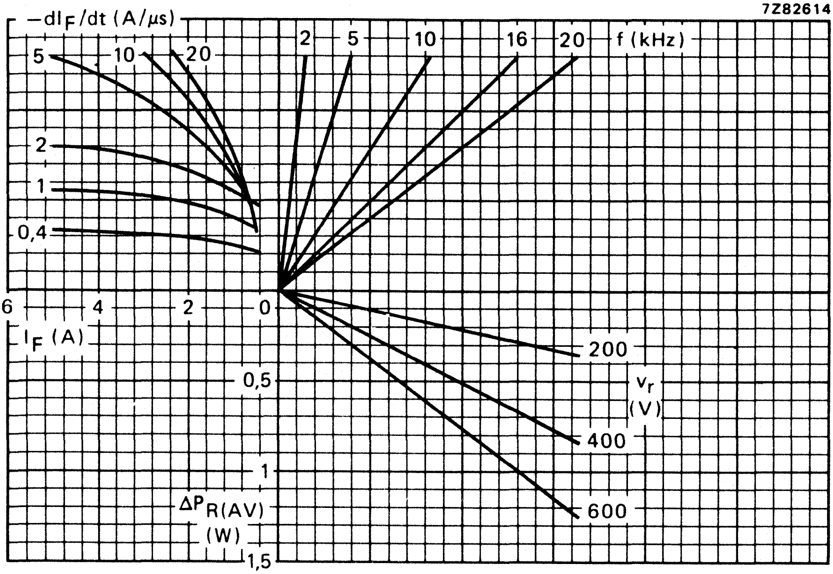


Fig. 11 Nomogram: power loss ($\Delta P_{R(AV)}$) due to switching only. To be added to steady state power losses (see also Fig. 4).

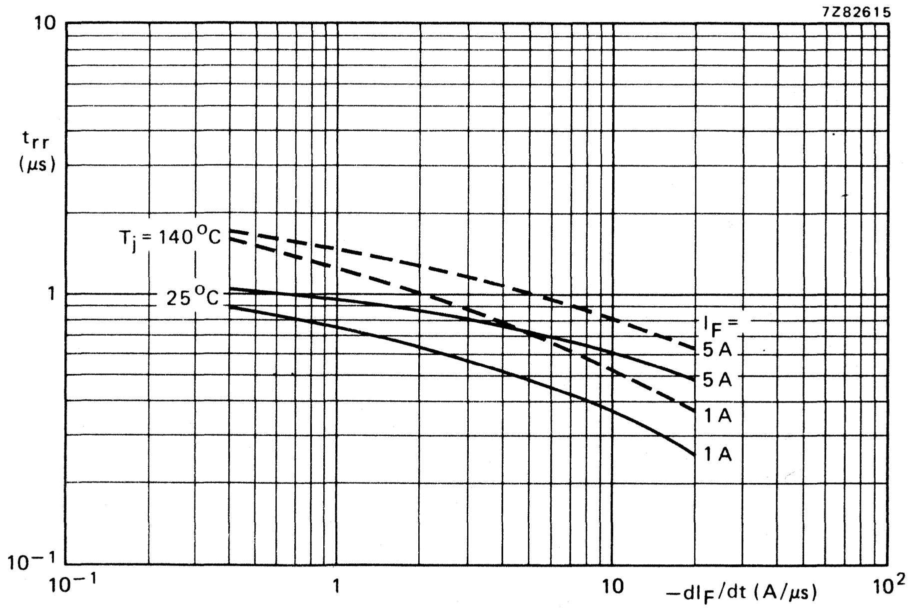


Fig. 12 Maximum values (see also Fig. 4).

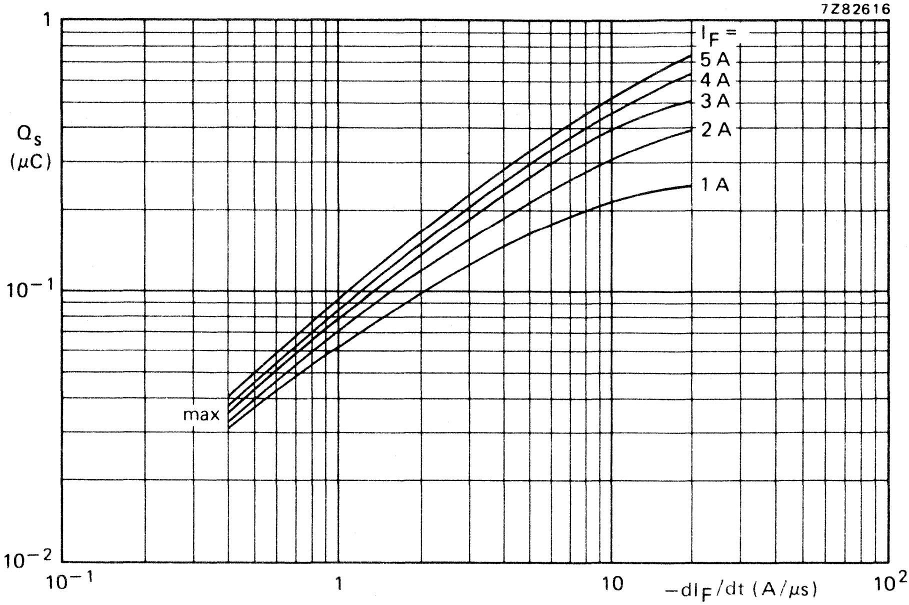


Fig. 13 Maximum values at T_j = 25 °C (see also Fig. 4).

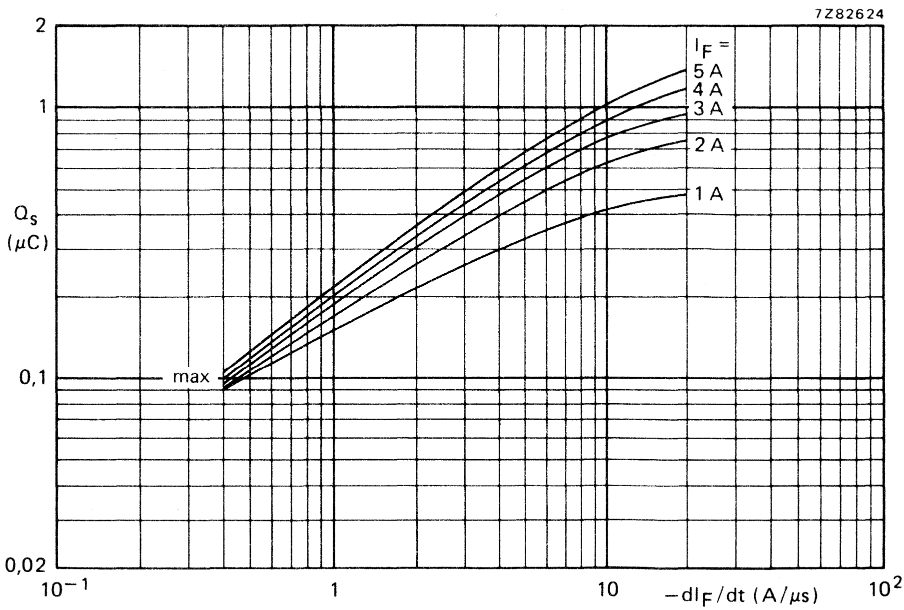


Fig. 14 Maximum values at T_j = 140 °C (see also Fig. 4).

AVALANCHE FAST SOFT-RECOVERY RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. They are intended for television and industrial applications, such as switched-mode power supplies, scan rectifiers in TV receivers, and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in the picture tube).

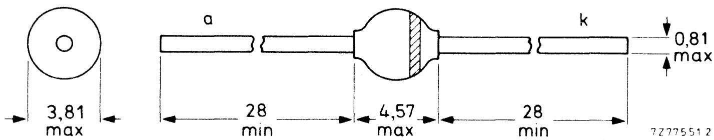
QUICK REFERENCE DATA

			BYV96D	BYV96E	
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	V
Continuous reverse voltage	V_R	max.	800	1000	V
Average forward current	$I_{F(AV)}$	max.	1,5		A
Non-repetitive peak forward current	I_{FSM}	max.	35		A
Non-repetitive peak reverse energy	E_{RSM}	max.	10		mJ
Reverse recovery time	t_{rr}	<	300		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

			BYV96D	BYV96E	
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	V
Continuous reverse voltage	V_R	max.	800	1000	V
Average forward current (averaged over any 20 ms period)					
T_{tp} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.	1,5		A
T_{amb} = 55 °C; Fig. 2	$I_{F(AV)}$	max.	0,8		A
Repetitive peak forward current	I_{FRM}	max.	10		A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRM\,max}$	I_{FSM}	max.	35		A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	10		mJ
Storage temperature	T_{stg}		−65 to + 175		°C
Operating junction temperature	T_j	max.	175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\,j\text{-}tp}$ = 46 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 µm; Fig. 2 (see "Thermal model") — $R_{th\,j\text{-}a}$ = 100 K/W

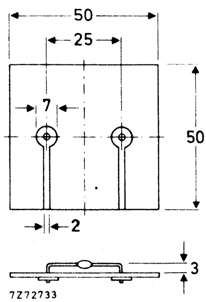


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYV96D	BYV96E	
Forward voltage					
I_F = 3 A	V_F	<	1,6	1,6	V*
I_F = 3 A; $T_j = T_{j\,max}$	V_F	<	1,35	1,35	V*
Reverse avalanche breakdown voltage					
I_R = 0,1 mA	$V_{(BR)R}$	>	900	1100	V
Reverse current					
$V_R = V_{RRM\,max}$; T_j = 165 °C	I_R	<	150		μA
Reverse recovery when switched from I_F = 1 A to $V_R \geq 30$ V with $-dI_F/dt$ = 20 A/μs					
recovered charge	Q_s	<	400		nC
recovery time	t_{rr}	<	300		ns
Maximum slope of reverse recovery current when switched from I_F = 1 A to $V_R \geq 30$ V; $-dI_F/dt$ = 1 A/μs	$\|dI_R/dt\|$	<	5		A/μs

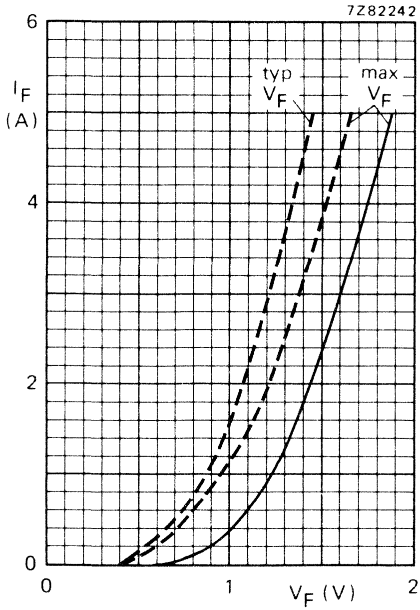


Fig. 3 —— T_j = 25 °C; – – – $T_j = T_{j\,max}$.

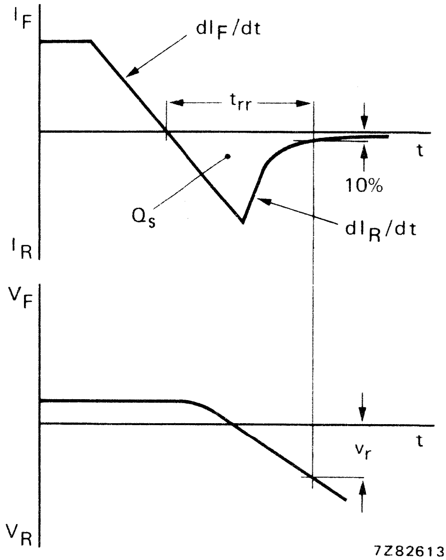


Fig. 4 Definitions of t_{rr} and Q_s.

* Measured under pulse conditions to avoid excessive dissipation.

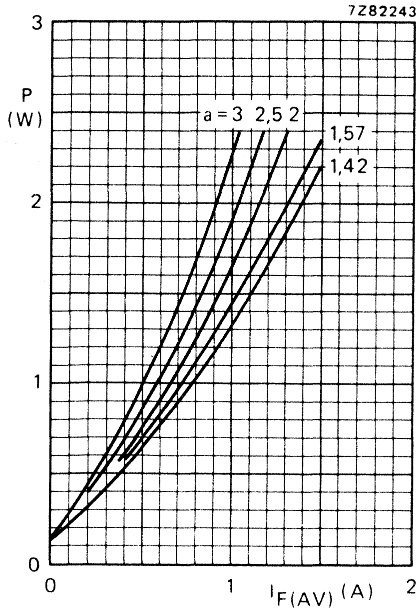
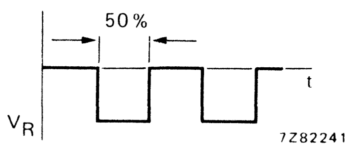


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.
The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\,max}$



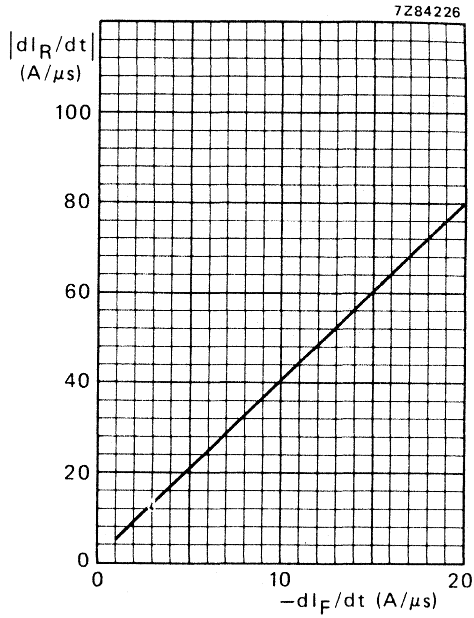


Fig. 6 Maximum slope of reverse recovery current. T_j = 25 °C.

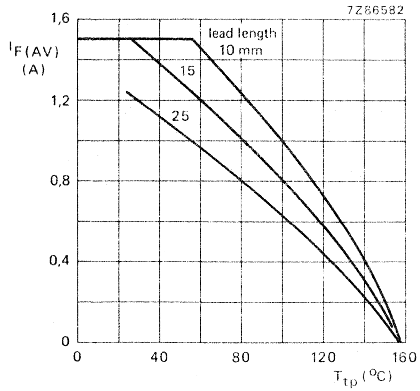


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRM\,max}$; δ = 50%; a = 1,57.

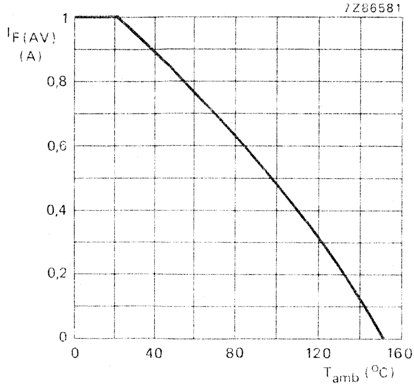


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage.
Mounting method see Fig. 2.

The graph is for switched-mode application. $V_R = V_{RRM\,max}$; δ = 50%; a = 1,57.

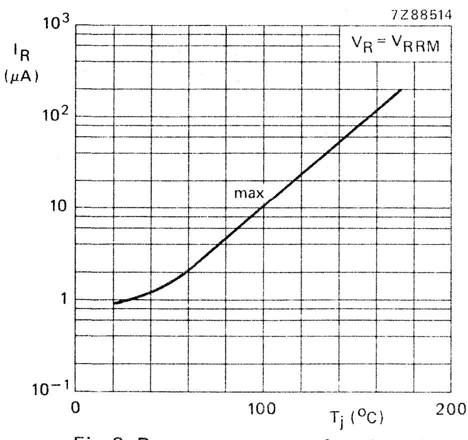


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM\,max}$.

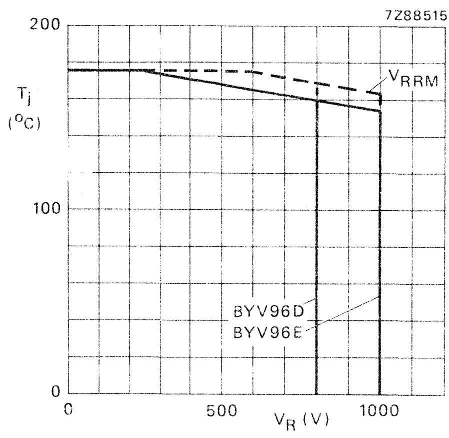


Fig. 10 Maximum values junction temperature.

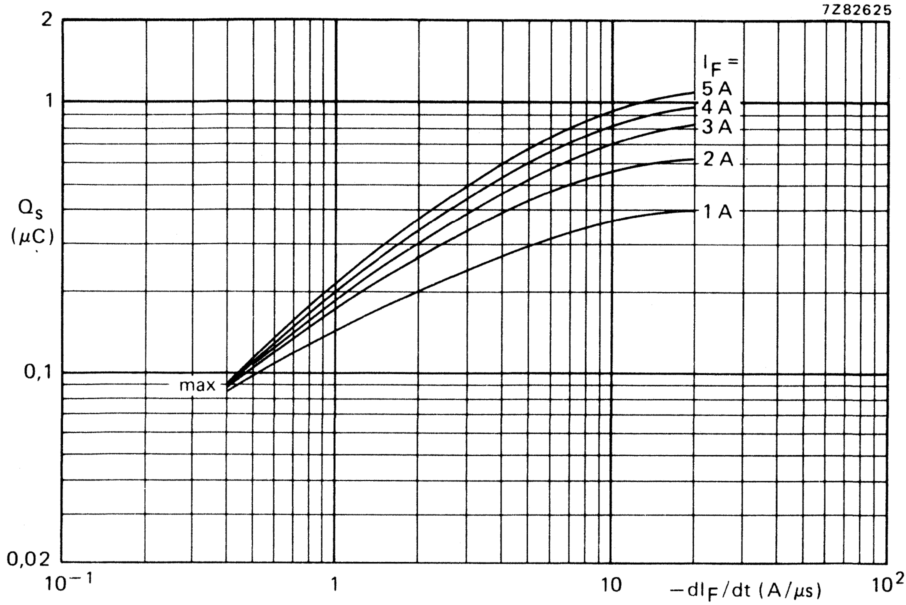


Fig. 11 Maximum values; T_j = 25 °C (see also Fig. 4).

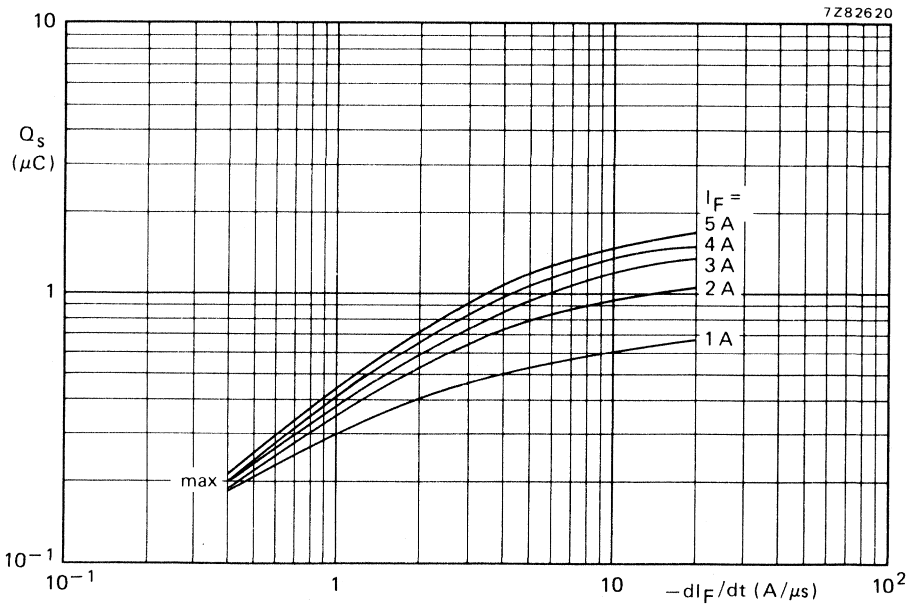


Fig. 12 Maximum values; T_j = 140 °C (see also Fig. 4).

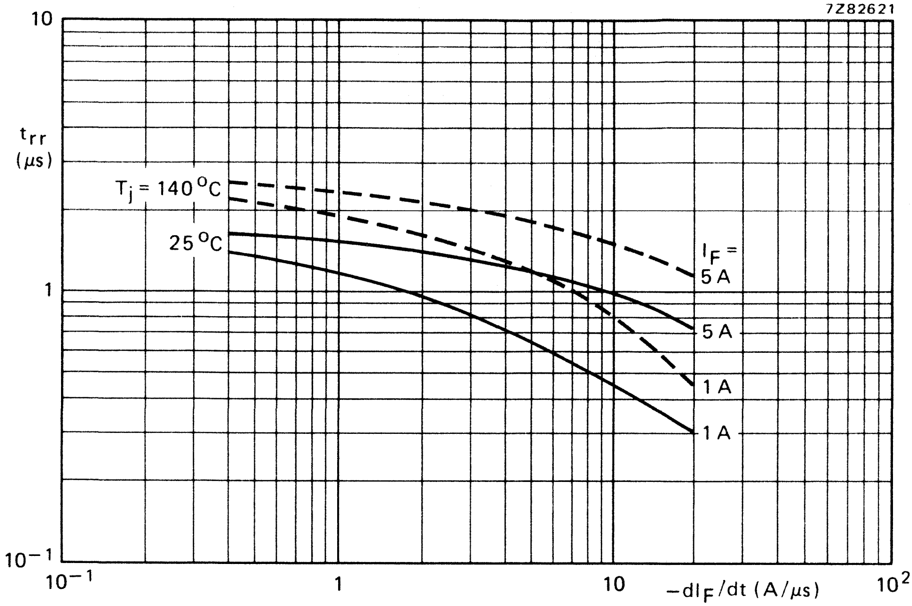


Fig. 13 Maximum values (see also Fig. 4).

CONTROLLED AVALANCHE RECTIFIER DIODES

Double-diffused glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes, capable of absorbing reverse transients.

They are intended for rectifier applications in colour television circuits as well as general purpose applications in telephony equipment.

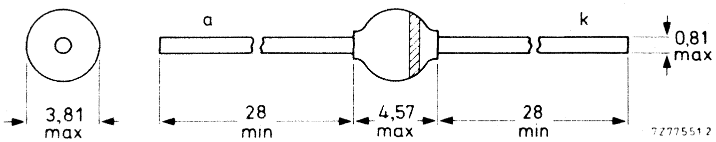
QUICK REFERENCE DATA

			BYW54	BYW55	BYW56	
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	650	900	1100	V
		<	1000	1300	1600	V
Average forward current	$I_{F(AV)}$	max.	2	2	2	A
Non-repetitive peak forward current	I_{FSM}	max.		50		A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.		1		kW
Junction temperature	T_j	max.		175		°C ←

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

Products approved to CECC 50 008-015 available on request.

RATINGS

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

			BYW54	BYW55	BYW56	
Crest working reverse voltage	V_{RWM}	max.	600	800	1000	V
Continuous reverse voltage (Fig. 9)	V_R	max.	600	800	1000	V
Average forward current (averaged over any 20 ms period); T_{tp} = 35 °C; lead length 10 mm	$I_{F(AV)}$	max.		2		A
T_{amb} = 75 °C; Fig. 2 mounting	$I_{F(AV)}$	max.		0,8		A
Repetitive peak forward current	I_{FRM}	max.		12		A
Non-repetitive peak forward current (Figs 7 and 12) t = 10 ms, half sinewave	I_{FSM}	max.		50		A
Non-repetitive peak reverse power dissipation (t = 20 μs; half sine-wave); $T_j = T_{j\,max}$ prior to surge	P_{RSM}	max.		1		kW
Non-repetitive peak reverse avalanche mode pulse energy; I_R = 1 A; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.		20		mJ
Storage temperature	T_{stg}			−65 to +175		°C
→ Junction temperature	T_j	max.		175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\,j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ≥ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\,j\text{-}a}$	=	100	K/W

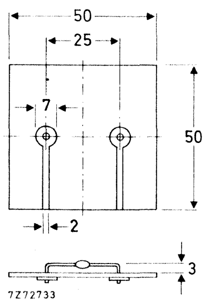


Fig. 2 Device mounted on a printed circuit board.

CHARACTERISTICS

			BYW54	BYW55	BYW56	
Forward voltage; $T_j = 25\ ^oC$ *						
$I_F = 1$ A	V_F	<	1	1	1	V
$I_F = 10$ A	V_F	<	1,65	1,65	1,65	V
Reverse avalanche breakdown voltage						
$I_R = 0,1$ mA; $T_j = 25\ ^oC$	$V_{(BR)R}$	>	650	900	1100	V
		<	1000	1300	1600	V
Reverse current						
$V_R = V_{RWM\ max}$; $T_j = 25\ ^oC$**	I_R	<		1,0		μA
$V_R = V_{RWM\ max}$; $T_j = 100\ ^oC$	I_R	<		10		μA
Reverse recovery charge when switched from $I_F = 1$ A to $V_R \geqslant 30$ V with $-dI_F/dt = 5$ A/μs; $T_j = 25\ ^oC$	Q_s	typ.		3		μC
Reverse recovery time when switched from $I_F = 1$ A to $V_R \geqslant 30$ V with $-dI_F/dt = 5$ A/μs; $T_j = 25\ ^oC$	t_{rr}	typ.		2,5		μs
Diode capacitance						
$V_R = 0$ V; f = 1 MHz; $T_j = 25\ ^oC$	C_d	typ.		50		pF

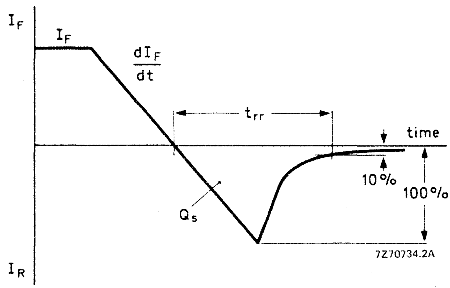


Fig. 3 Definitions of t_{rr} and Q_s.

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ⩽500 lux (daylight); relative humidity <65%.

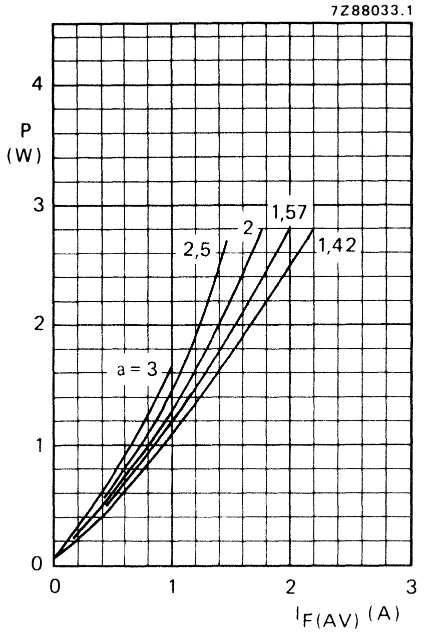


Fig. 4 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

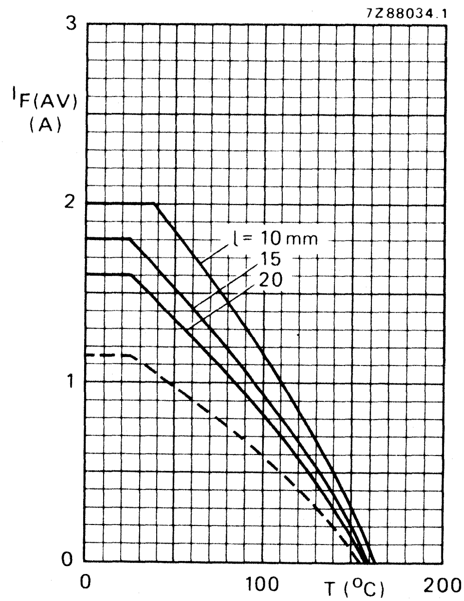


Fig. 5 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.

a = 1,57; $V_R = V_{RWMmax}$; l = lead length
——— T = tie-point temperature
– – – – T = ambient temperature and device mounted as shown in Fig. 2.

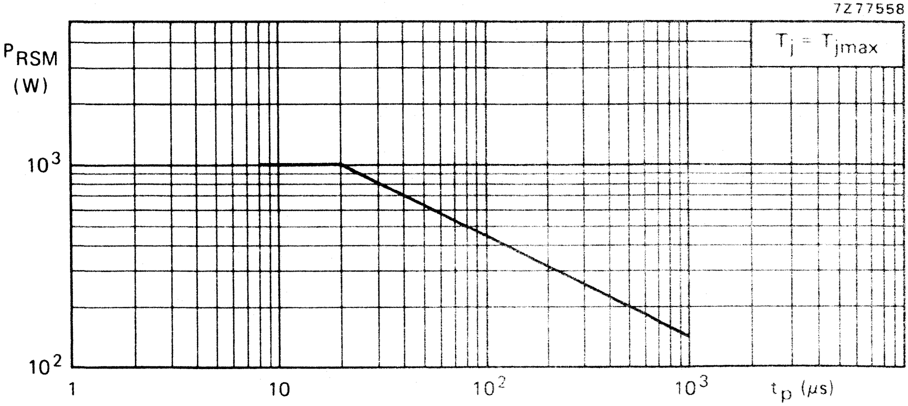
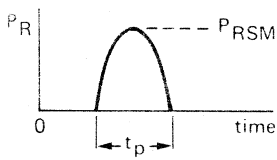


Fig. 6 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



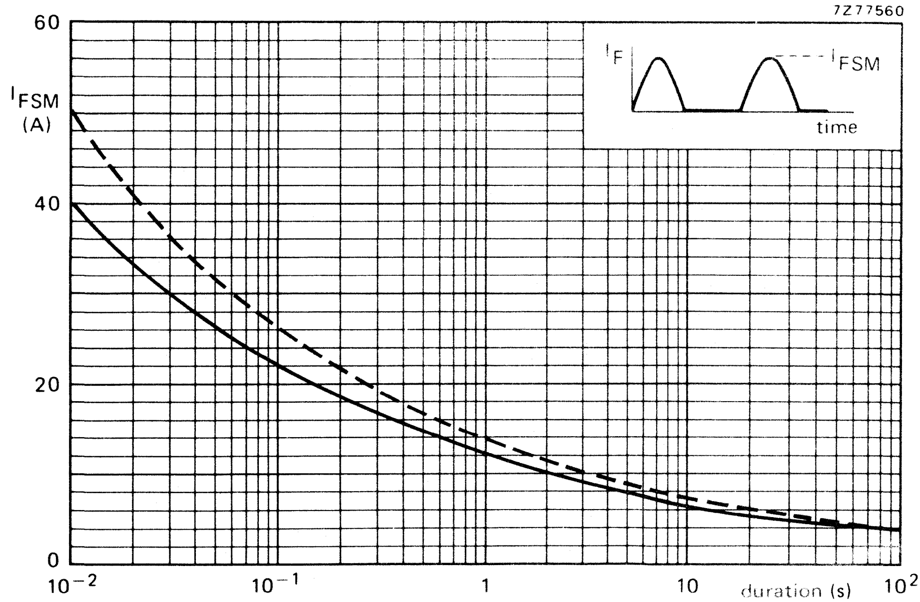


Fig. 7 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz).

– – – – – T_j = 25 °C; V_R = 0.

———— $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWM\,max}$.

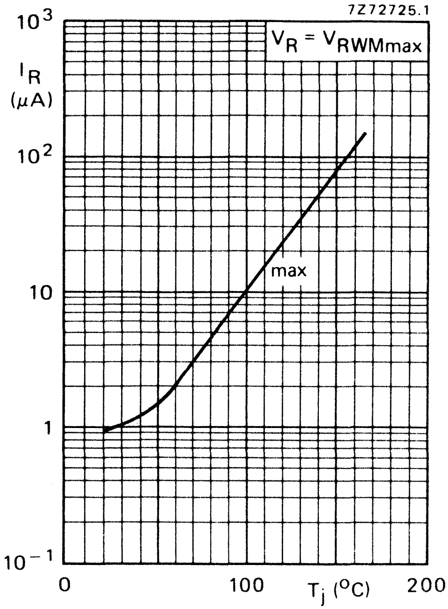


Fig. 8.

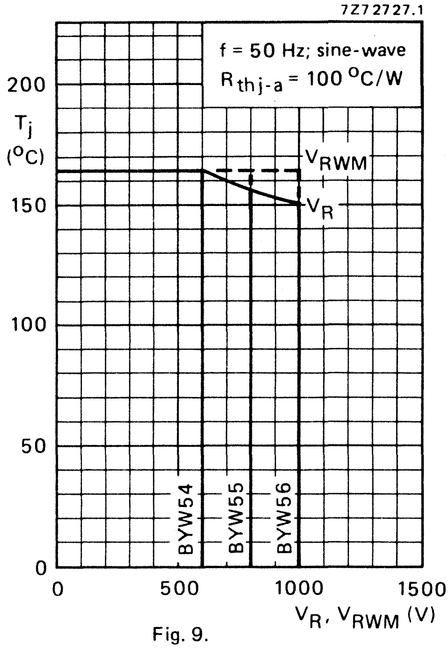


Fig. 9.

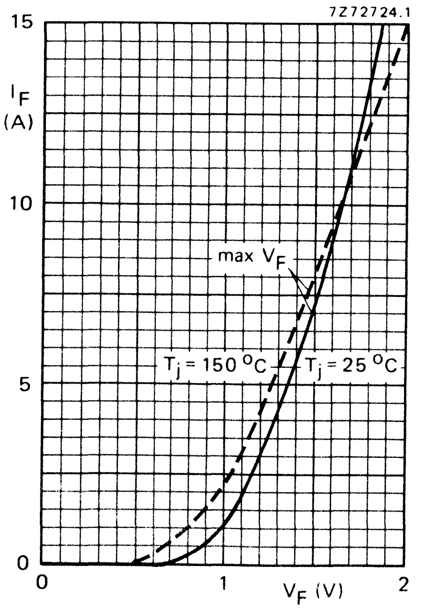


Fig. 10.

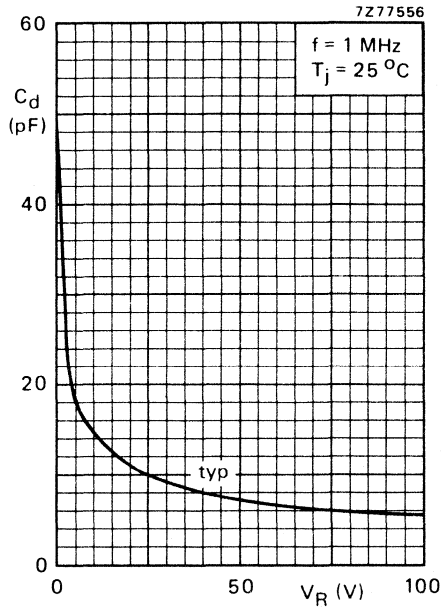


Fig. 11.

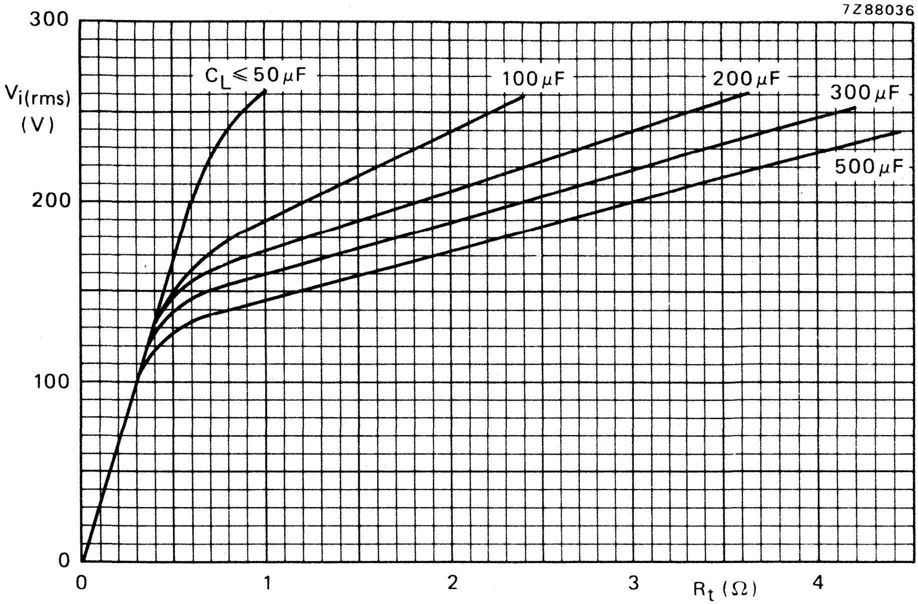


Fig. 12 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

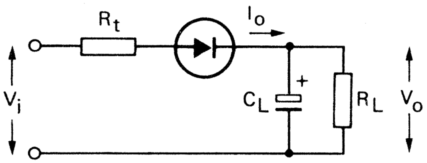


Fig. 13 Test circuit series resistance (R_t).

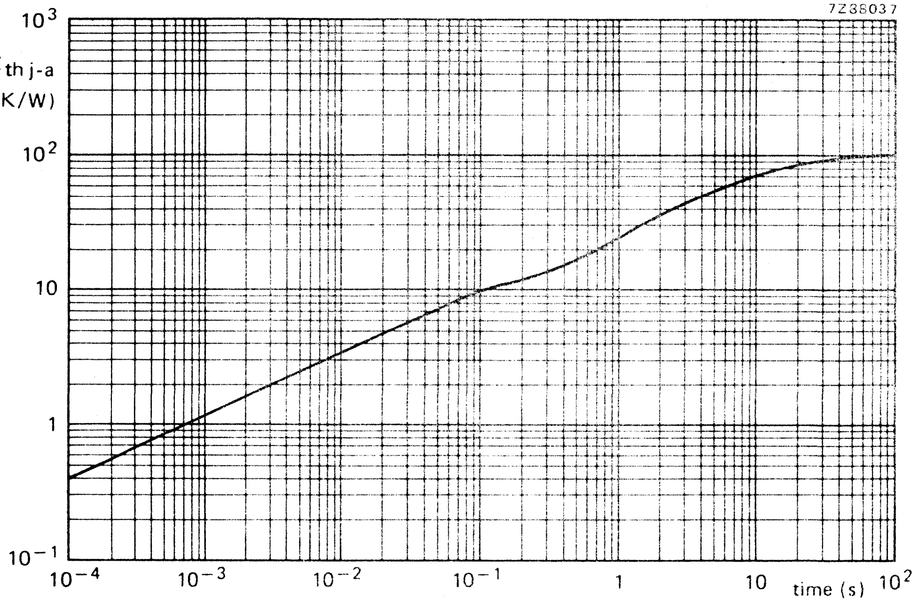


Fig. 14.
Device mounted on a printed circuit board (see Fig. 2).

AVALANCHE FAST SOFT-RECOVERY RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. They are intended for television and industrial applications, such as switched-mode power supplies, scan rectifiers, in TV receivers, and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in the picture tube).

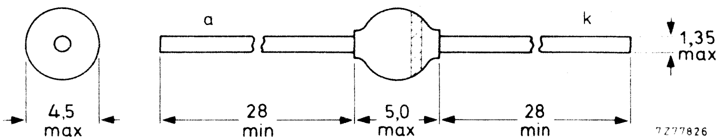
QUICK REFERENCE DATA

			BYW95A	B	C	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V
Average forward current	$I_{F(AV)}$	max.		3		A
Non-repetitive peak forward current	I_{FSM}	max.		70		A
Non-repetitive peak reverse energy	E_{RSM}	max.		10		mJ
Reverse recovery time	t_{rr}	<		250		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

			BYW95A	B	C	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	V
Continuous reverse voltage	V_R	max.	200	400	600	V
Average forward current (averaged over any 20 ms period)						
T_{tp} = 60 °C; lead length 10 mm	$I_{F(AV)}$	max.		3		A
T_{amb} = 65 °C; Fig. 2	$I_{F(AV)}$	max.		1,25		A
Repetitive peak forward current	I_{FRM}	max.		15		A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	I_{FSM}	max.		70		A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.		10		mJ
Storage temperature	T_{stg}			−65 to + 175		°C
Operating junction temperature	T_j	max.		175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	25	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	75	K/W

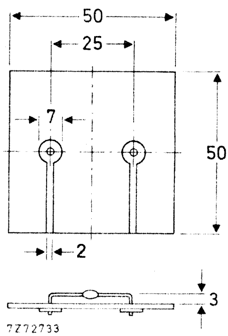


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

			BYW95A	B	C	
Forward voltage						
$I_F = 5\ A$	V_F	<	1,5	1,5	1,5	V *
$I_F = 5\ A;\ T_j = T_{j\ max}$	V_F	<	1,25	1,25	1,25	V *
Reverse avalanche breakdown voltage						
$I_R = 0,1\ mA$	$V_{(BR)R}$	>	300	500	700	V
Reverse current						
$V_R = V_{RRMmax};\ T_j = 165^o$	I_R	<		150		μA
Reverse recovery when switched from $I_F = 1\ A$ to $V_R \geqslant 30\ V$ with $-dI_F/dt = 20\ A/\mu s$						
recovered charge	Q_s	<		250		nC
recovery time	t_{rr}	<		250		ns
Maximum slope of reverse recovery current when switched from $I_F = 1\ A$ to $V_R \geqslant 30\ V$ with $-dI_F/dt = 1\ A/\mu s$	$\lvert dI_R/dt \rvert$	<		6		A/μs

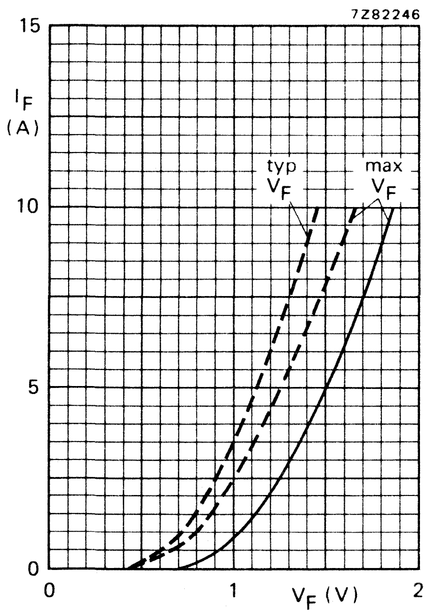


Fig. 3 —— $T_j = 25\ ^oC$; – – – $T_j = T_{j\ max}$.

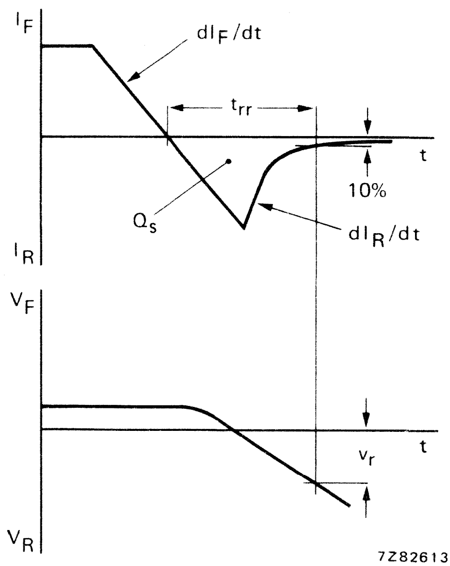


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

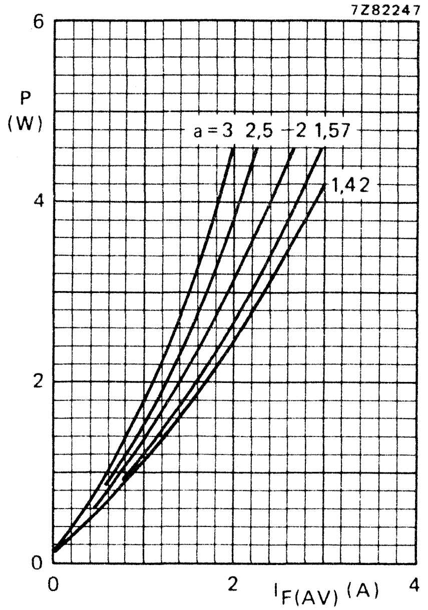


Fig. 5.

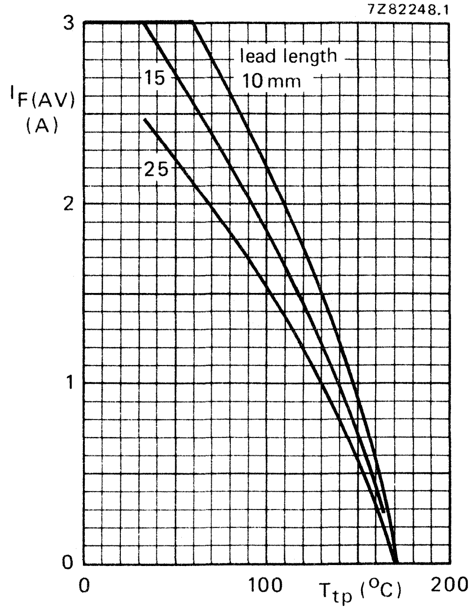


Fig. 6.

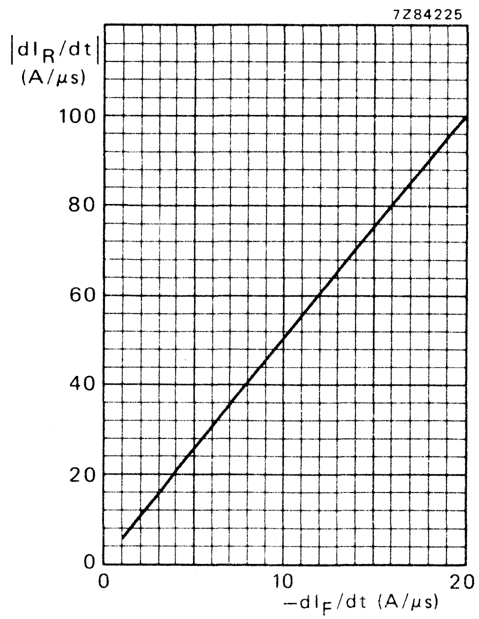


Fig. 7.

Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$

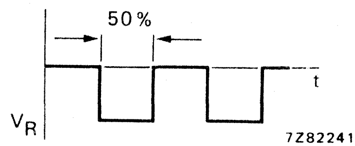


Fig. 6 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

Fig. 7 Maximum slope of reverse recovery current. T_j = 25 °C.

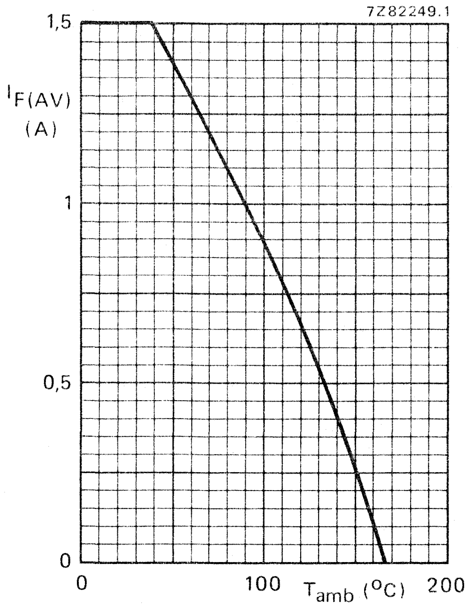


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

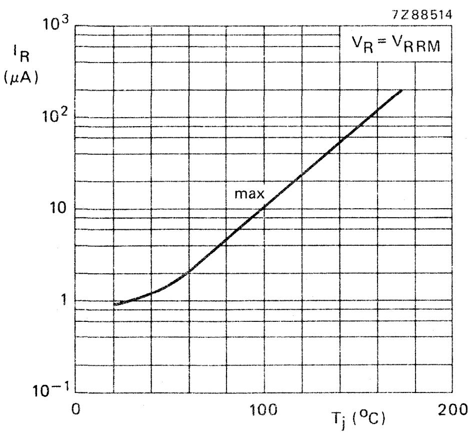


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM\,max}$.

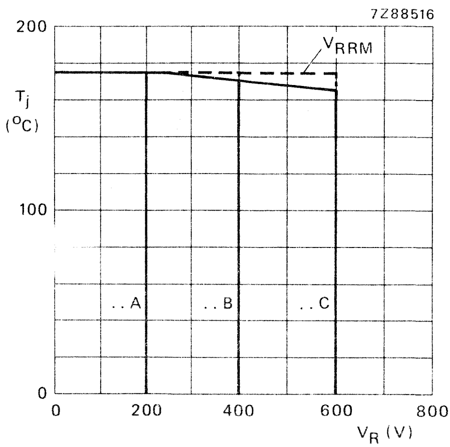


Fig. 10 Maximum values junction temperature as a function of reverse voltage.

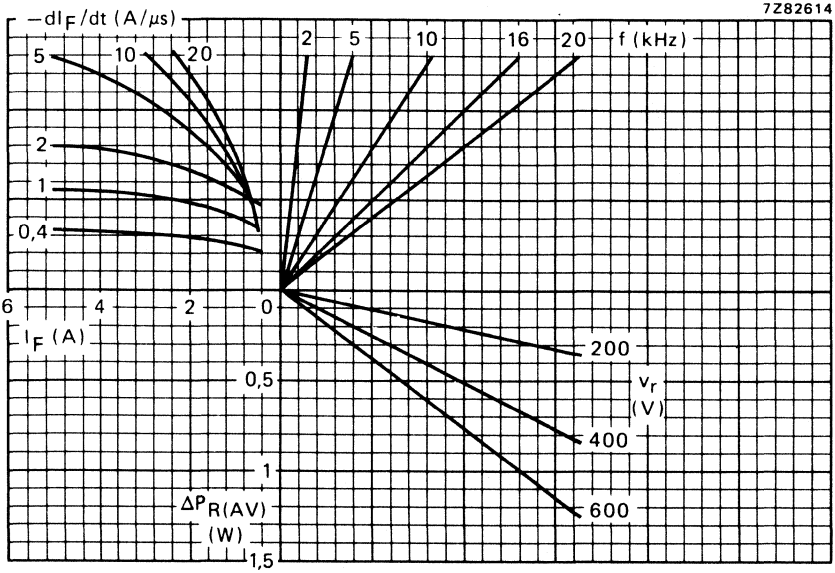


Fig. 11 Nomogram: power loss ($\Delta P_{R(AV)}$) due to switching only. To be added to steady state power losses (see also Fig. 4).

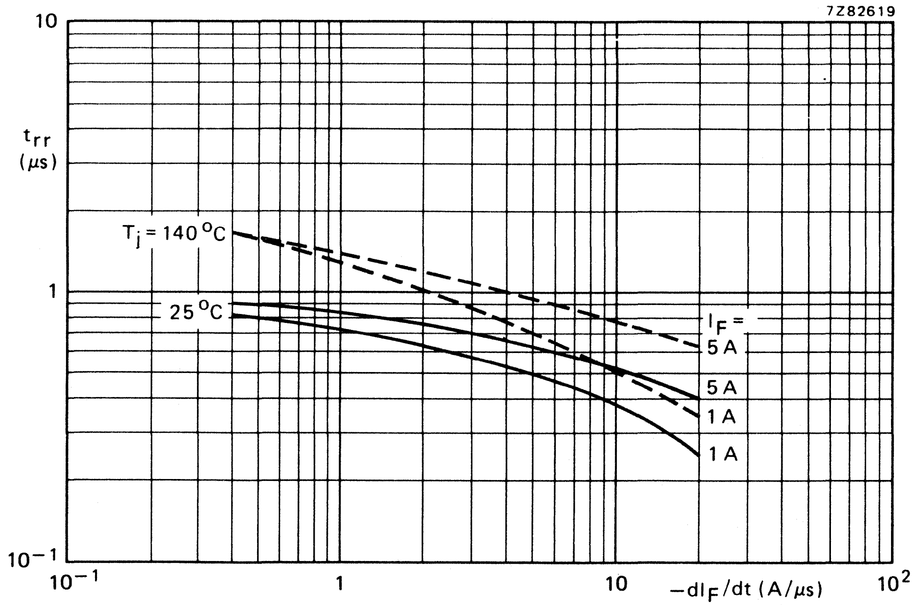


Fig. 12 Maximum values; for definitions see Fig. 4.

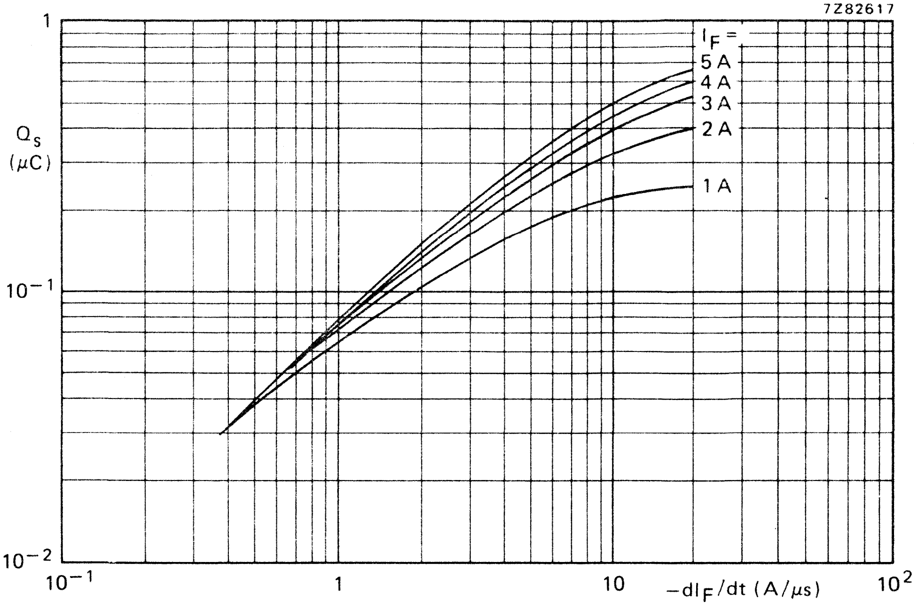


Fig. 13 Maximum values; T_j = 25 °C. For definitions see Fig. 4.

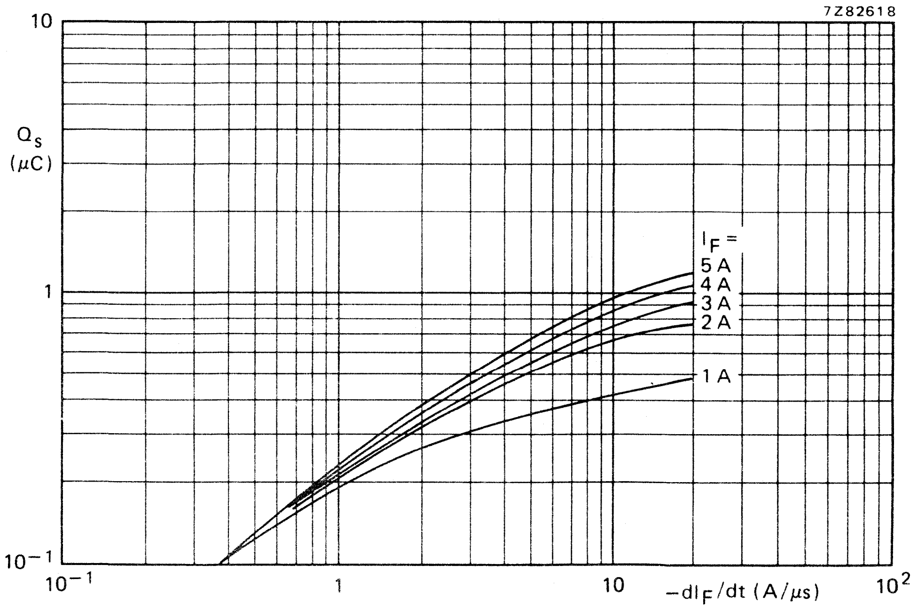


Fig. 14 Maximum values; T_j = 140 °C. For definitions see Fig. 4.

AVALANCHE FAST SOFT-RECOVERY RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes. They are intended for television and industrial applications, such as switched-mode power supplies, scan rectifiers, in TV receivers, and also for use in inverter and converter applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient energy (e.g. during flashover in the picture tube).

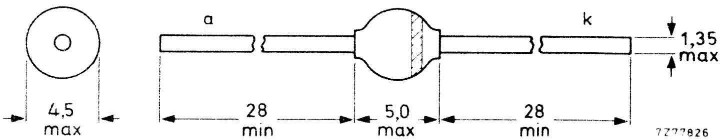
QUICK REFERENCE DATA

			BYW96D	BYW96E	
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	V
Continuous reverse voltage	V_R	max.	800	1000	V
Average forward current	$I_{F(AV)}$	max.	3		A
Non-repetitive peak forward current	I_{FSM}	max.	70		A
Non-repetitive peak reverse energy	E_{RSM}	max.	10		mJ
Reverse recovery time	t_{rr}	<	300		ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

			BYW96D	BYW96E	
Repetitive peak reverse voltage	V_{RRM}	max.	800	1000	V
Continuous reverse voltage	V_R	max.	800	1000	V
Average forward current (averaged over any 20 ms period)					
T_{tp} = 50 °C; lead length 10 mm	$I_{F(AV)}$	max.	3		A
T_{amb} = 55 °C; Fig. 2	$I_{F(AV)}$	max.	1,25		A
Repetitive peak forward current	I_{FRM}	max.	15		A
Non-repetitive peak forward current (t = 10 ms; half sine-wave) $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	I_{FSM}	max.	70		A
Non-repetitive peak reverse avalanche energy; I_R = 400 mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	E_{RSM}	max.	10		mJ
Storage temperature	T_{stg}		−65 to + 175		°C
Operating junction temperature	T_j	max.	175		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\,j\text{-}tp}$ = 25 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model") — $R_{th\,j\text{-}a}$ = 75 K/W

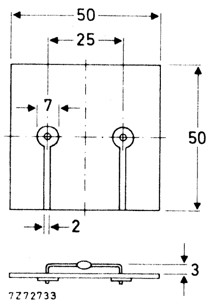


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYW96D	BYW96E	
Forward voltage					
I_F = 5 A	V_F	<	1,5	1,5	V *
I_F = 5 A; $T_j = T_{j\ max}$	V_F	<	1,25	1,25	V *
Reverse avalanche breakdown voltage					
I_R = 0,1 mA	$V_{(BR)R}$	>	900	1100	V
Reverse current					
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<	150		μA
Reverse recovery when switched from I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 20 A/μs					
recovered charge	Q_s	<	400		nC
recovery time	t_{rr}	<	300		ns
Maximum slope of reverse recovery current when switched from I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 1 A/μs	$\lvert dI_R/dt \rvert$	<	5		A/μs

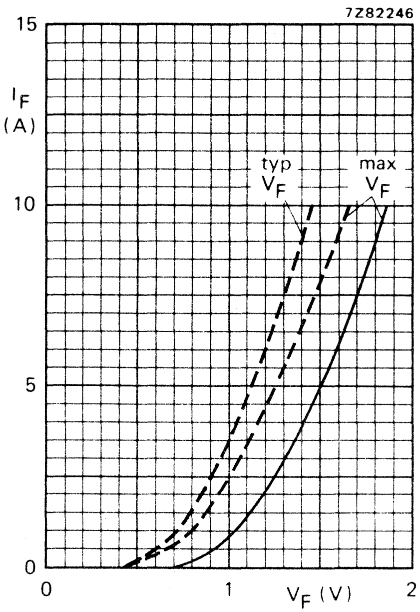


Fig. 3 —— T_j = 25 °C; – – – $T_j = T_{j\ max}$

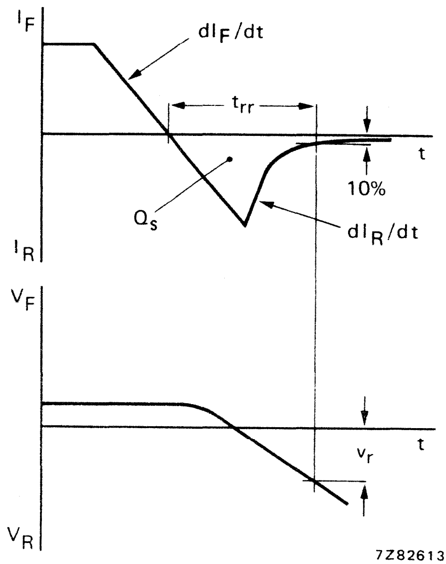


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

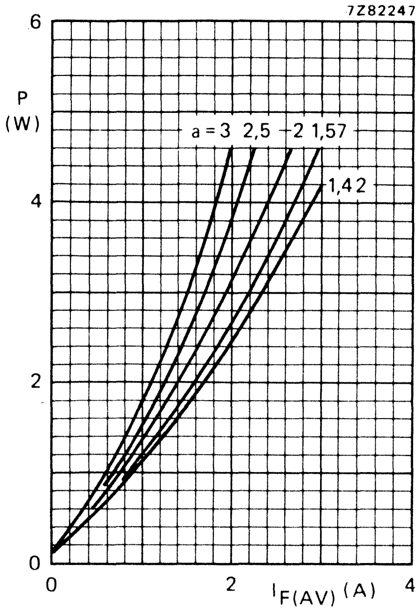
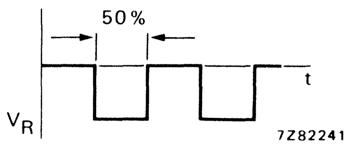


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$



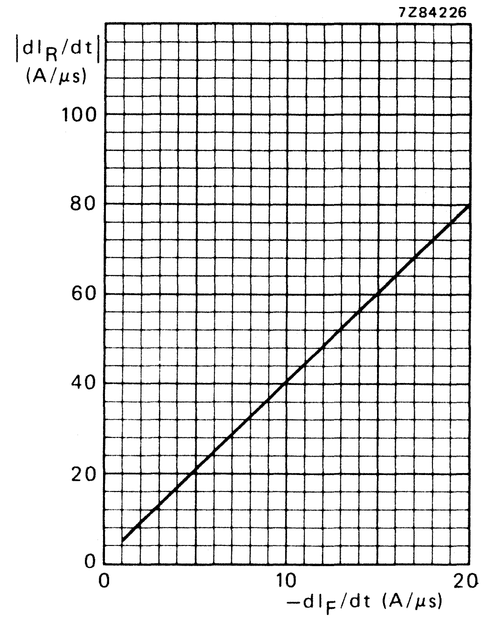


Fig. 6 Maximum slope of reverse recovery current. T_j = 25 °C.

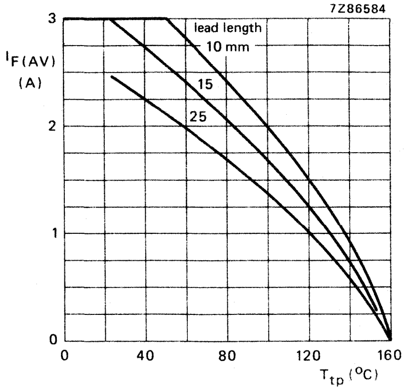


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

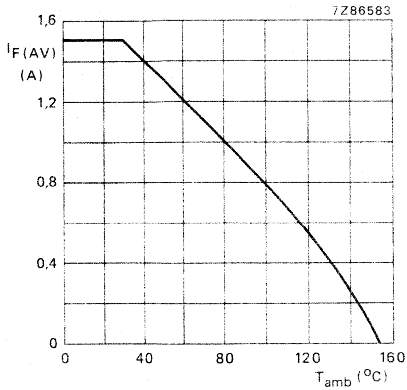


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

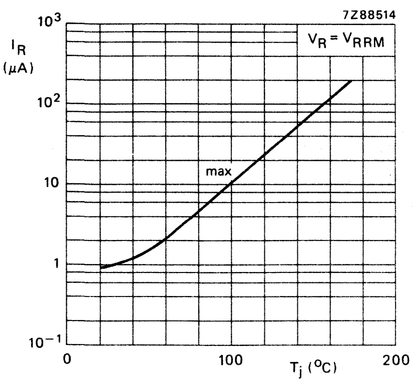


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRMmax}$.

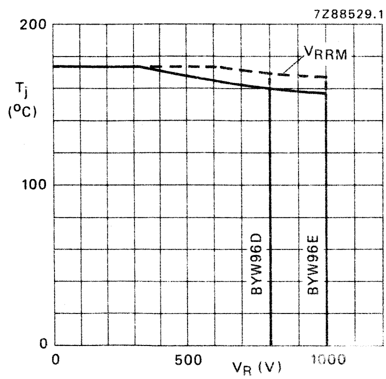


Fig. 10 Maximum values junction temperature as a function of reverse voltage.

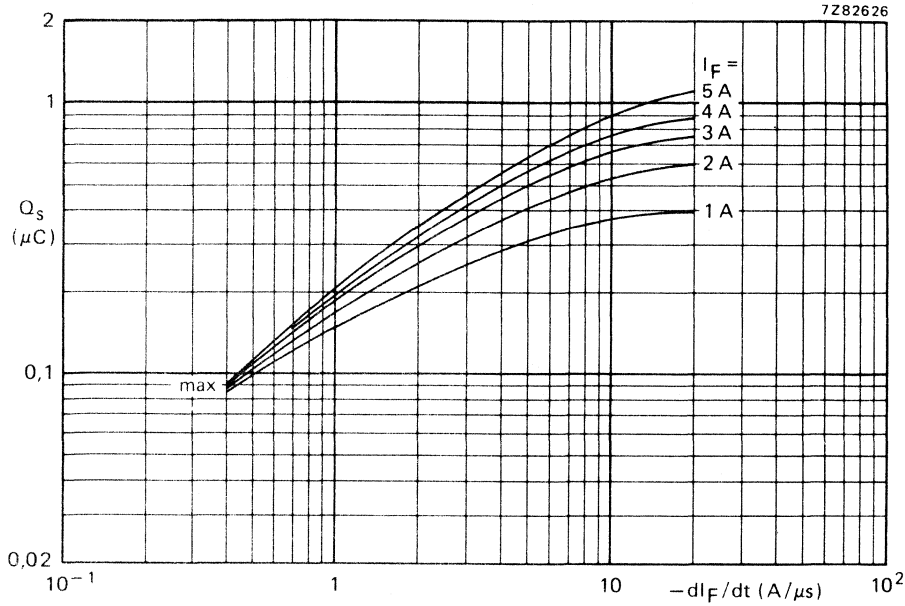


Fig. 11 Maximum values at T_j = 25 °C (see also Fig. 4).

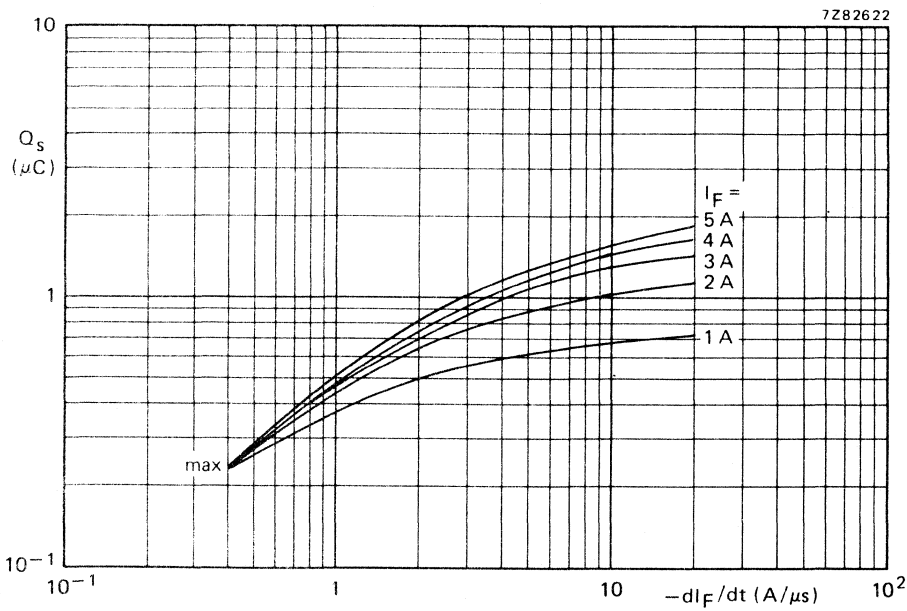


Fig. 12 Maximum values at T_j = 140 °C (see also Fig. 4).

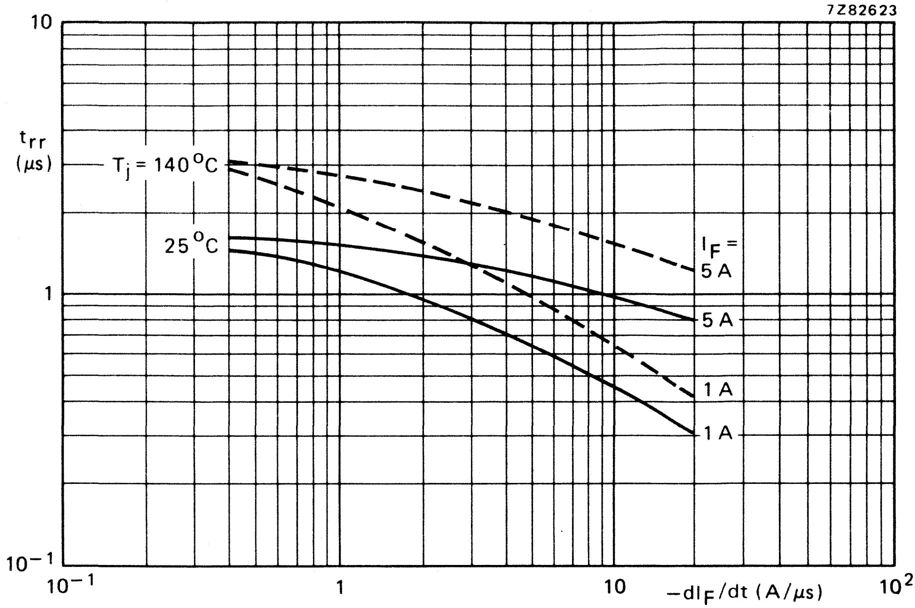


Fig. 13 Maximum values. For definitions see Fig. 4.

E.H.T. AVALANCHE FAST SOFT-RECOVERY DIODE

E.H.T. rectifier diode in glass envelope intended for general purpose high-voltage rectifying and also designed as sub-component for very high voltage stacks, for example, in X-ray equipment with frequencies up to 20 kHz and in radar apparatus and microwave ovens.

Because of the smallness of the envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test cases).

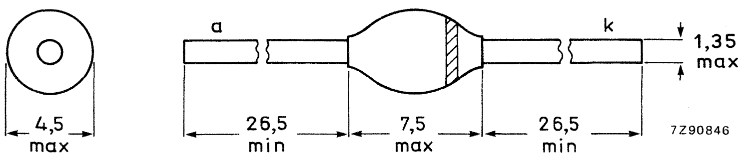
QUICK REFERENCE DATA

Crest working reverse voltage	V_{RWM}	max.	6	kV
Repetitive peak reverse voltage	V_{RRM}	max.	7,5	kV
Average forward current up to T_{oil} = 45 °C	$I_{F(AV)}$	max.	550	mA
Non-repetitive peak forward current	I_{FSM}	max.	20	A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.	5	kW
Junction temperature	T_j	max.	165	°C
Reverse recovery time	t_{rr}	<	350	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-83.



The marking band indicates the cathode.

RATINGS

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

Crest working reverse voltage	V_{RWM}	max.	6	kV
Repetitive peak reverse voltage; $\delta \leqslant 0{,}01$	V_{RRM}	max.	7,5	kV
Non-repetitive peak reverse voltage; $t \leqslant 10$ ms	V_{RSM}	max.	8	kV
Average forward current (averaged over any 20 ms period) up to T_{oil} = 45 °C; continuous operation	$I_{F(AV)}$	max.	550	mA
Repetitive peak forward current; intermittent operation	I_{FRM}	max.	5	A
Non-repetitive peak forward current; t = 10 ms, half-sinewave; T_j = 165 °C prior to surge	I_{FSM}	max.	20	A
Non-repetitive peak reverse power dissipation; t = 10 μs, triangular pulse; T_j = 165 °C prior to surge	P_{RSM}	max.	5	kW
Storage temperature	T_{stg}	−65 to +165		°C
Junction temperature	T_j	max.	165	°C

THERMAL RESISTANCE

From junction to oil	$R_{th\ j\text{-}o}$	=	20	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage I_F = 2 A	V_F	<	14,5	V
Peak reverse current V_R = 6 kV; T_j = 165 °C	I_R	<	50	μA
Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A; measured at I_R = 0,25 A	t_{rr}	<	350	ns

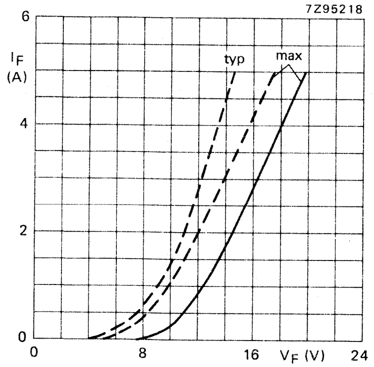


Fig. 2 ——— T_j = 25 °C
------------ T_j = 165 °C.

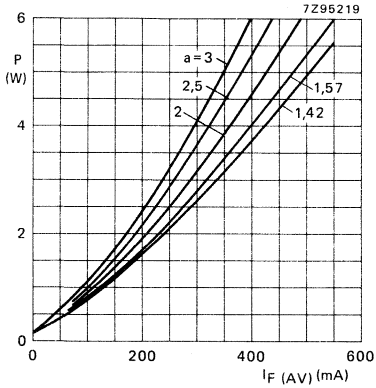


Fig. 3 Steady-state power dissipation (forward plus leakage current) versus average forward current; $V_R = V_{RWMmax}$; δ = 50%; $a = I_{F(RMS)}/I_{F(AV)}$.

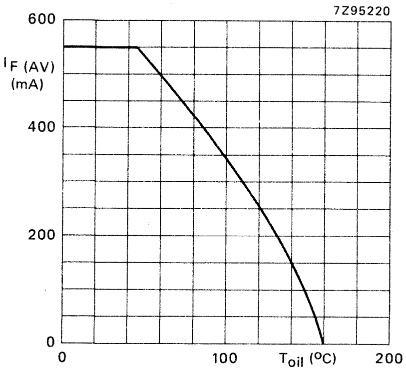


Fig. 4 Maximum average forward current versus oil temperature; curve includes losses due to reverse leakage; $V_R = V_{RWMmax}$; δ = 50%; a = 1,57.

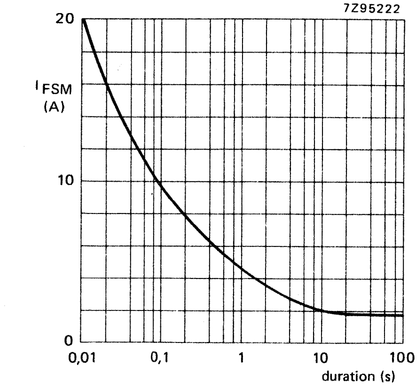
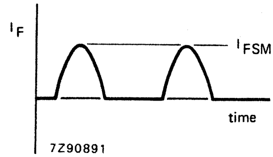


Fig. 5 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz); $V_R = V_{RWMmax}$; T_j = 165 °C prior to surge.



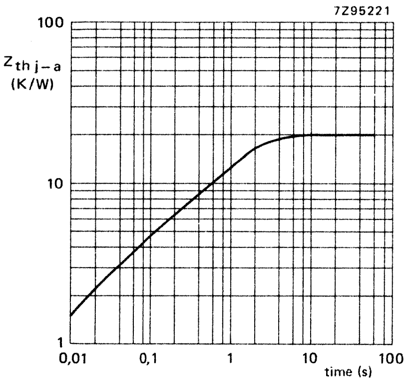


Fig. 6.

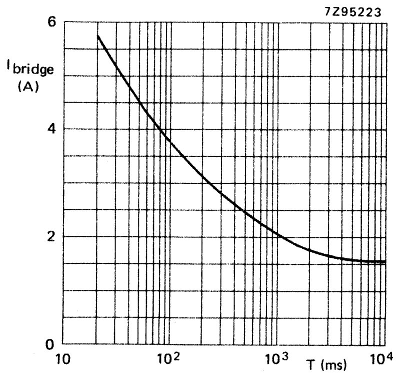
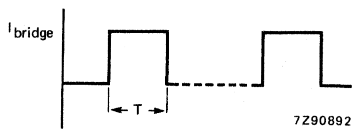


Fig. 7 Maximum permissible output current in a 3-phase rectifier bridge with a minimum time between exposures of 20 s; T_{oil} = 50 °C.



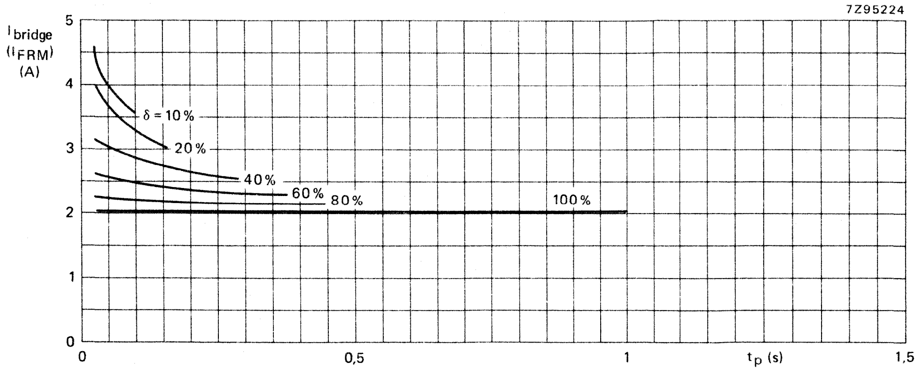


Fig. 8 Maximum current through a 3-phase rectifier bridge versus pulse duration; exposure time T = 1 s; T_{oil} = 50 °C; (see Fig. 10).

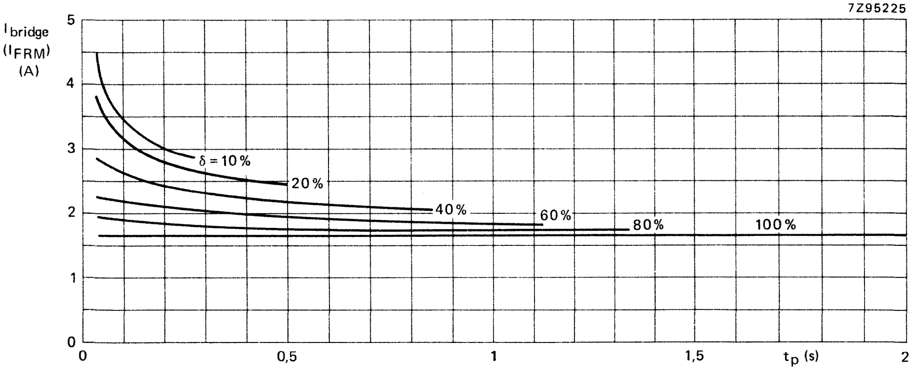


Fig. 9 Maximum current through a 3-phase rectifier bridge versus pulse duration; exposure time T = 3 s; T_{oil} = 50 °C; (see Fig. 10).

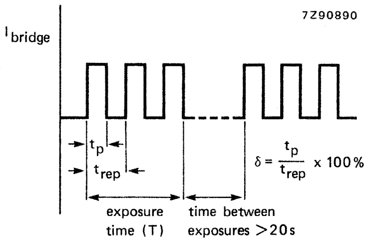


Fig. 10.

VOLTAGE REGULATOR DIODES

Diodes in hermetically sealed axial leaded ID-envelopes.
They are intended for use as voltage regulator in medium power regulator circuits.
The series consists of BZD23-C3V9 to BZD23-C270.

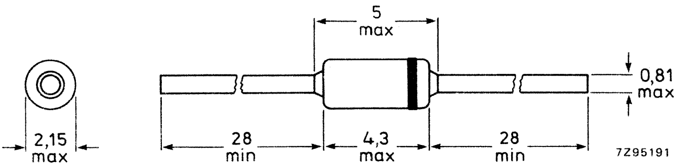
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3,9 to 270	V
Working voltage tolerance (E24 range)			± 5	%
Total power dissipation	P_{tot}	max.	2,5	W
Non-repetitive peak reverse power dissipation T_j = 25 °C; t_p = 100 μs	P_{ZSM}	max.	300	W

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-81.



The marking band indicates the cathode.

RATINGS

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

Total power dissipation				
T_{tp} = 25 °C; lead length 10 mm	P_{tot}	max.	2,5	W
T_{amb} = 55 °C; p.c.b. mounting (Fig. 2)	P_{tot}	max.	1,0	W
Non-repetitive peak reverse power dissipation				
t_p = 100 μs square pulse; T_j = 25 °C (prior to surge)	P_{ZSM}	max.	300	W
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	60	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2	$R_{th\ j\text{-}a}$	=	120	K/W

(see „thermal model")

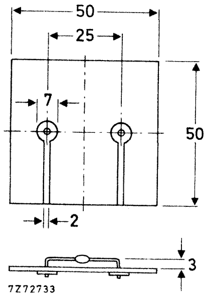


Fig. 2 Mounted on a printed-circuit board.

REGULATOR DIODES

Glass passivated diodes in hermetically sealed axial-leaded glass envelopes. They are intended for use as voltage regulator and transient suppressor diode in medium power regulation and transient suppression circuits.

The series consists of BZT03-C7V5 to BZT03-C270 in the normalized E24 (± 5%) range.

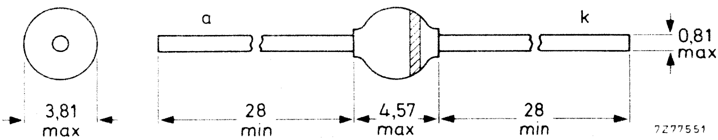
QUICK REFERENCE DATA

			voltage regulator	transient suppressor	
Working voltage range	V_Z	nom.	7,5 to 270		V
Stand-off voltage	V_R			6,2 to 220	V
Total power dissipation	P_{tot}	max.	3,25		W
Non-repetitive peak reverse power dissipation $T_j = 25\ ^oC$; $t_p = 100\ \mu s$	P_{RSM}	max.		600	W

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

RATINGS

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

Total power dissipation			
T_{tp} = 25 °C; lead length 10 mm	P_{tot}	max.	3,25 W
T_{amb} = 45 °C; p.c.b. mounting (Fig. 2)	P_{tot}	max.	1,3 W
Repetitive peak reverse power dissipation	P_{ZRM}	max.	10 W
Non-repetitive peak reverse power dissipation;			
t_p = 100 μs, square pulse; T_j = 25 °C (prior to surge)	P_{RSM}	max.	600 W
waveform 10/1000 exponential pulse (Fig. 3); T_j = 25 °C (prior to surge)	P_{RSM}	max.	300 W
Storage temperature	T_{stg}	−65 to + 175 °C	
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\ j\text{-}tp}$ = 46 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 — $R_{th\ j\text{-}a}$ = 100 K/W

→ (see "Thermal model")

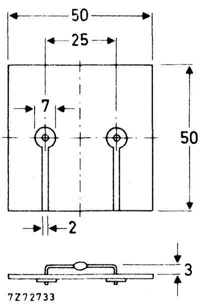


Fig. 2 Mounted on a printed-circuit board.

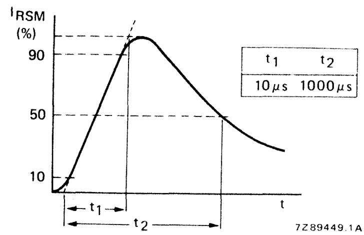


Fig. 3 Current pulse according to IEC 60-2, Section 6.

CHARACTERISTICS

Forward voltage

I_F = 0,5 A; T_j = 25 °C — V_F < 1,2 V

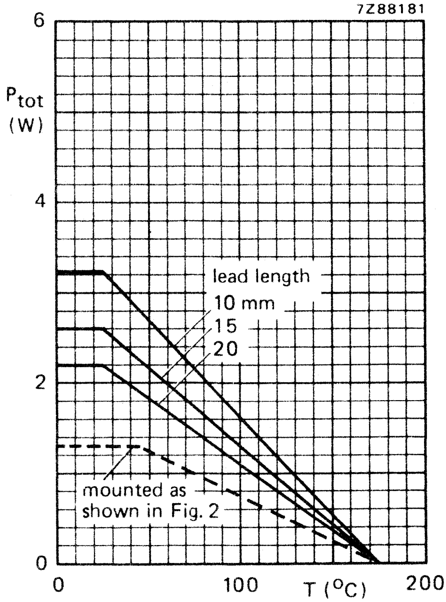


Fig. 4 Maximum total power dissipation as a function of temperature.
——— = T_{tp}; – – – – = T_{amb}; Fig. 2.

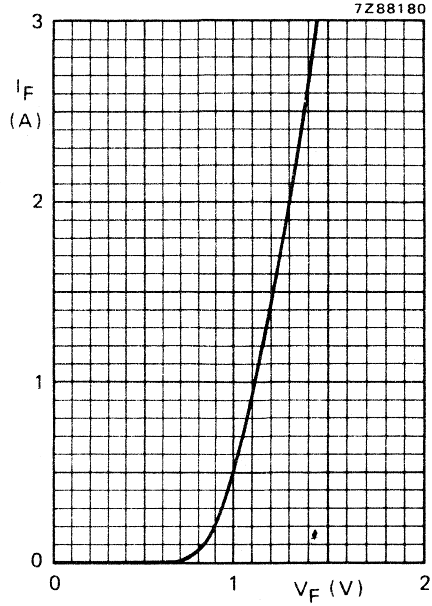
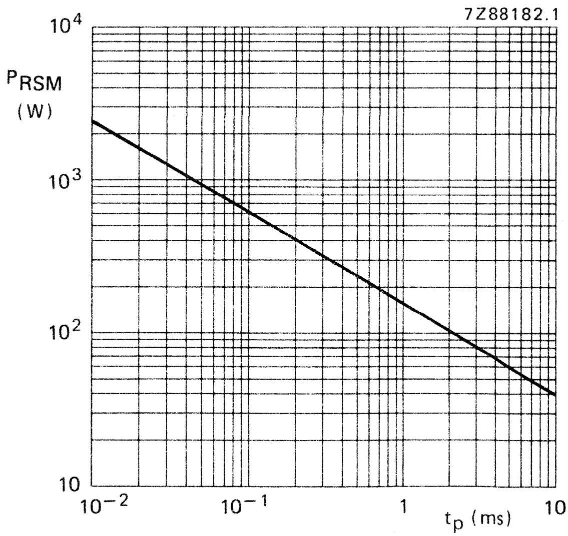


Fig. 5 Typical forward voltage drop T_j = 25 °C.



ig. 6 Maximum non-repetitive peak reverse power dissipation; square current pulse; T_j = 25 °C prior to surge.

CHARACTERISTICS when used as voltage regulator diodes; T_j = 25 °C

BZT03-XXXX	working voltage V_Z (V)			differential resistance r_{diff} (Ω)		temperature coefficient S_Z (%/K)		test current I_Z (mA)	reverse current I_R (µA) at	reverse voltage V_R (V)
	min.	typ.	max.	typ.	max.	min.	max.		max.	
C7V5	7,0	7,5	7,9	1	2	0	0,07	100	750	5,6
C8V2	7,7	8,2	8,7	1	2	0,03	0,08	100	600	6,2
C9V1	8,5	9,1	9,6	2	4	0,03	0,08	50	20	6,8
C10	9,4	10,0	10,6	2	4	0,05	0,09	50	10	7,5
C11	10,4	11,0	11,6	4	7	0,05	0,10	50	4	8,2
C12	11,4	12,0	12,7	4	7	0,05	0,10	50	3	9,1
C13	12,4	13,0	14,1	5	10	0,05	0,10	50	2	10
C15	13,8	15,0	15,6	5	10	0,05	0,10	50	1	11
C16	15,3	16,0	17,1	6	15	0,06	0,11	25	1	12
C18	16,8	18,0	19,1	6	15	0,06	0,11	25	1	13
C20	18,8	20,0	21,2	6	15	0,06	0,11	25	1	15
C22	20,8	22,0	23,3	6	15	0,06	0,11	25	1	16
C24	22,8	24,0	25,6	7	15	0,06	0,11	25	1	18
C27	25,1	27,0	28,9	7	15	0,06	0,11	25	1	20
C30	28	30	32	8	15	0,06	0,11	25	1	22
C33	31	33	35	8	15	0,06	0,11	25	1	24
C36	34	36	38	21	40	0,06	0,11	10	1	27
C39	37	39	41	21	40	0,06	0,11	10	1	30
C43	40	43	46	24	45	0,07	0,12	10	1	33
C47	44	47	50	24	45	0,07	0,12	10	1	36
C51	48	51	54	25	60	0,07	0,12	10	1	39
C56	52	56	60	25	60	0,07	0,12	10	1	43
C62	58	62	66	25	80	0,08	0,13	10	1	47
C68	64	68	72	25	80	0,08	0,13	10	1	51
C75	70	75	79	30	100	0,08	0,13	10	1	56
C82	77	82	87	30	100	0,08	0,13	10	1	62
C91	85	91	96	60	200	0,09	0,13	5	1	68
C100	94	100	106	60	200	0,09	0,13	5	1	75
C110	104	110	116	80	250	0,09	0,13	5	1	82
C120	114	120	127	80	250	0,09	0,13	5	1	91
C130	124	130	141	110	300	0,09	0,13	5	1	100
C150	138	150	156	130	300	0,09	0,13	5	1	110
C160	153	160	171	150	350	0,09	0,13	5	1	120
C180	168	180	191	180	400	0,09	0,13	5	1	130
C200	188	200	212	200	500	0,09	0,13	5	1	150
C220	208	220	233	350	750	0,09	0,13	2	1	160
C240	228	240	256	400	850	0,09	0,13	2	1	180
C270	251	270	289	450	1000	0,09	0,13	2	1	200

CHARACTERISTICS when used as transient suppressor diodes; T_j = 25 °C

clamping voltage (10/1000 pulse) $V_{(CL)R}$ V	at	non-repetitive peak reverse current I_{RSM} A	reverse current at recommended stand-off voltage I_R μA	V_R V	BZT03-XXXX
max.			max.		
11,3		26,5	1500	6,2	C7V5
12,3		24,4	1200	6,8	C8V2
13,3		22,7	50	7,5	C9V1
14,8		20,3	20	8,2	C10
15,7		19,1	5	9,1	C11
17,0		17,7	5	10	C12
18,9		15,9	5	11	C13
20,9		14,4	5	12	C15
22,9		13,1	5	13	C16
25,6		11,7	5	15	C18
28,4		10,6	5	16	C20
31		9,7	5	18	C22
33,8		8,9	5	20	C24
38,1		7,9	5	22	C27
42,2		7,1	5	24	C30
46,2		6,5	5	27	C33
50,1		6,0	5	30	C36
54,1		5,5	5	33	C39
60,7		4,9	5	36	C43
65,5		4,6	5	39	C47
70,8		4,2	5	43	C51
78,6		3,8	5	47	C56
86,5		3,5	5	51	C62
94,4		3,2	5	56	C68
103,5		2,9	5	62	C75
114,0		2,6	5	68	C82
126		2,4	5	75	C91
139		2,2	5	82	C100
152		2,0	5	91	C110
167		1,8	5	100	C120
185		1,6	5	110	C130
204		1,5	5	120	C150
224		1,3	5	130	C160
249		1,2	5	150	C180
276		1,1	5	160	C200
305		1,0	5	180	C220
336		0,9	5	200	C240
380		0,8	5	220	C270

VOLTAGE REFERENCE DIODES

The BZV10 to 14 are temperature compensated voltage reference diodes in a DO-34 envelope. They are primarily intended for use as voltage reference sources in measuring instruments such as digital voltmeters.

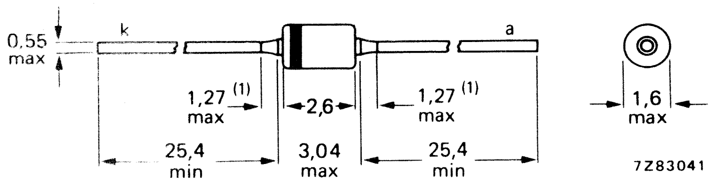
QUICK REFERENCE DATA

			min.	nom.	max.	
Reference voltage at I_Z = 2,0 mA		V_{ref}	6,175	6,5	6,825	V
Temperature coefficient at I_Z = 2,0 mA (see notes 1 and 2 and Fig. 3)	**BZV10**	$\lvert S_Z \rvert$		< 0,01		%/K
	BZV11	$\lvert S_Z \rvert$		< 0,005		%/K
	BZV12	$\lvert S_Z \rvert$		< 0,002		%/K
	BZV13	$\lvert S_Z \rvert$		< 0,001		%/K
	BZV14	$\lvert S_Z \rvert$		< 0,0005		%/K
Operating ambient temperature		T_{amb}		0 to + 70		°C

MECHANICAL DATA

Dimensions in mm

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



Cathode indicated by coloured band.

RATINGS

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

Working current (d.c.)	I_Z	max.	50 mA
Working current (peak value)	I_{ZM}	max.	50 mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400 mW
Storage temperature	T_{stg}		−65 to +200 °C
Operating ambient temperature	T_{amb}		0 to +70 °C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,375 K/mW

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

		min.	nom.	max.	
Reference voltage at I_Z = 2,0 mA	V_{ref}	6,175	6,5	6,825	V

Reference voltage excursion at I_Z = 2,0 mA*

Ambient temperature test points: 0; +25 °C and +70 °C (see notes 1 and 2 on the next page)

BZV10	$\|\Delta V_{ref}\|$	<	46,0	mV
BZV11	$\|\Delta V_{ref}\|$	<	23,0	mV
BZV12	$\|\Delta V_{ref}\|$	<	9,0	mV
BZV13	$\|\Delta V_{ref}\|$	<	4,6	mV
BZV14	$\|\Delta V_{ref}\|$	<	2,3	mV

Temperature coefficient at I_Z = 2,0 mA*
(see notes 1 and 2 on the next page)

BZV10	$\|S_Z\|$	<	± 0,01	%/K
BZV11	$\|S_Z\|$	<	± 0,005	%/K
BZV12	$\|S_Z\|$	<	± 0,002	%/K
BZV13	$\|S_Z\|$	<	± 0,001	%/K
BZV14	$\|S_Z\|$	<	± 0,0005	%/K

Differential resistance at I_Z = 2,0 mA	r_{diff}	typ.	30	Ω
		<	50	Ω

* For accuracy of I_Z see Fig. 3.

Notes

1. I_Z tolerance and stability of I_Z.

   The quoted values of ΔV_{ref} are based on a constant current I_Z. Two factors can cause V_{ref} to change, namely the differential resistance r_{diff} and the temperature coefficient S_Z.

   a. As the max. r_{diff} of the device can be 50 Ω, a change of 0,01 mA in the current through the reference diode will result in a ΔV_{ref} of 0,01 mA x 50 Ω = 0,5 mV. This level of ΔV_{ref} is not significant on a BZV10 ($\Delta V_{ref} < 46$ mV), it is however very significant on a BZV14 ($\Delta V_{ref} < 2{,}3$ mV).

   b. The temperature coefficient of the reference voltage S_Z is a function of I_Z. Reference diodes are classified at the specified test current and the S_Z of the reference diode will be different at the different levels of I_Z. The absolute value of I_Z is important, however, the stability of I_Z, once the level has been set, is far more significant. This applies particularly to the BZV13 and BZV14. The effect of I_Z stability on S_Z is shown in Fig. 3.

2. Voltage excursion (ΔV_{ref} and temperature coefficient).

   All reference diodes are characterized by the 'box method'. This guarantees a maximum voltage excursion (ΔV_{ref}) over the specified temperature range, at the specified test current (I_Z), verified by tests at indicated temperature points within the range. V_Z is measured and recorded at each temperature specified. The ΔV_{ref} between the highest and lowest values must not exceed the maximum ΔV_{ref} given. The temperature coefficient, therefore is given only as a reference; but may be derived from:

$$S_Z = \frac{(V_{ref\,1} - V_{ref\,2}) \times 100}{(T_{amb2} - T_{amb1}) \times V_{ref\,nom}} \ \%/K.$$

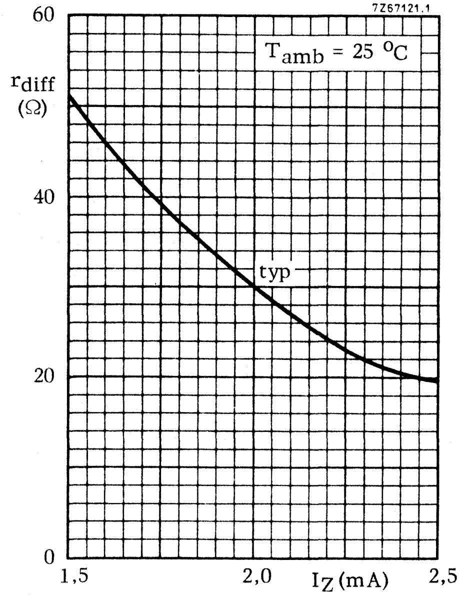


Fig. 2 Typical values differential resistance.

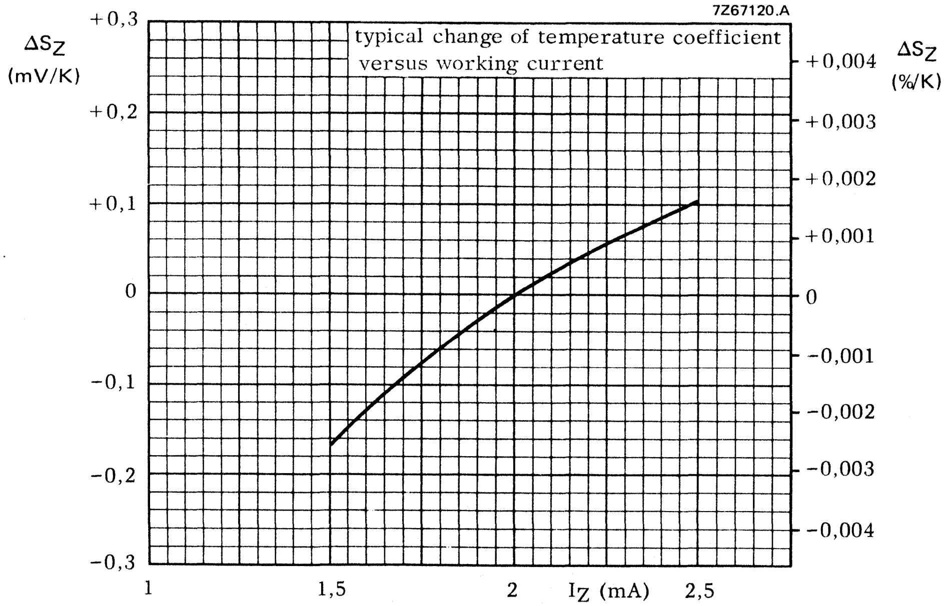


Fig. 3 Typical change of temperature coefficient.

SYMMETRICAL VOLTAGE REGULATOR DIODE

Silicon planar symmetrical regulator diode in DO-34 (SOD-68) envelope, intended for use as voltage stabilizer and transient protection element.

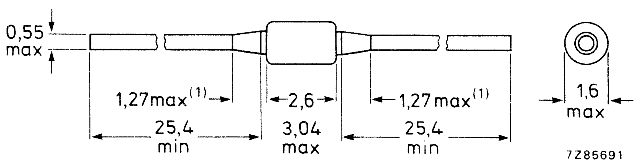
QUICK REFERENCE DATA

Working voltage	V_Z	nom.	6,5	V
Total power dissipation	P_{tot}	max.	400	mW
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	40	W
Non-repetitive peak reverse current	I_{RSM}	max.	7	A
Junction temperature	T_j	max.	200	°C

MECHANICAL DATA

Dimensions in mm

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



RATINGS

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

Working current (d.c.)	I_Z	max.	50 mA
Non-repetitive peak reverse current			
$t = 30$ s, $T_j = 25\ ^oC$ prior to surge (Fig. 2)			
$t_1/t_2 = 8/20\ \mu s$	I_{RSM}	max.	7 A
$t_1/t_2 = 10/1000\ \mu s$	I_{RSM}	max.	2 A
Total power dissipation			
$T_{amb} < 50\ ^oC$	P_{tot}	max.	400 mW
Non-repetitive peak reverse power dissipation			
($t = 100\ \mu s$, rectangular pulse)			
$T_j = 25\ ^oC$ prior to surge	P_{ZSM}	max.	40 W
$T_j = 150\ ^oC$ prior to surge	P_{ZSM}	max.	30 W
Storage temperature	T_{stg}	−65 to +200	^oC
Junction temperature	T_j	max.	200 ^oC

THERMAL RESISTANCE

from junction to ambient	$R_{th\ j\text{-}a}$	=	0,38 K/mW

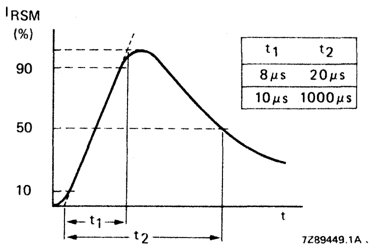


Fig. 2 Current pulse according to IEC 60-2, Section 6.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Working voltage				
I_Z = 5 mA	V_Z	6,2 to	6,8	V
		typ.	6,5	V
Clamping voltage				
I_{RSM} = 7 A (t_1/t_2 = 8/20 μs)	$V_{(CL)R}$	<	25	V
I_{RSM} = 2 A (t_1/t_2 = 10/1000 μs)	$V_{(CL)R}$	<	15	V
Reverse current				
V_R = 4 V	I_R	<	10	μA
V_R = 4 V; T_j = 150 °C	I_R	<	30	μA
V_R = 2 V	I_R	<	3	μA
Differential resistance				
I_Z = 5 mA	r_{diff}	<	20	Ω
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	150	pF ←
Temperature coefficient of the working voltage at I_Z = 5 mA	$\|S_Z\|$	<	0,1	%/K

LOW VOLTAGE STABISTORS

Silicon planar integrated voltage regulator diodes, intended for low power clipping, level shifting, voltage regulation and temperature stabilization of transistor base-emitter biasing network. The stabistors operate in the forward mode thus the cathode must be adjacent to the negative connection.

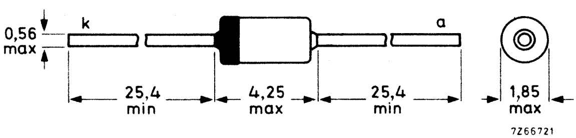
QUICK REFERENCE DATA

			BZV46–1V5	2V0	
Regulation voltage ranges	V_F	>	1,35	2,00	V
		<	1,55	2,30	V
Continuous reverse voltage	V_R	max.	4	4	V
Repetitive peak forward current	I_{FRM}	max.	120	80	mA
Total power dissipation up to T_{amb} = 55 °C	P_{tot}	max.	250	250	mW
Differential resistance I_F = 5 mA; f = 1 kHz	r_{diff}	<	20	30	Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD–27 (DO–35).



Cathode indicated by coloured end.

RATINGS

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

			BZV46–1V5	2V0	
Continuous reverse voltage	V_R	max.	4	4	V
Repetitive peak reverse voltage	V_{RRM}	max.	4	4	V
Repetitive peak forward current	I_{FRM}	max.	120	80	mA
Total power dissipation up to T_{amb} = 55 °C	P_{tot}	max.	250		mW
Storage temperature	T_{stg}		–65 to + 150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

From junction to ambient in free air see Fig. 2

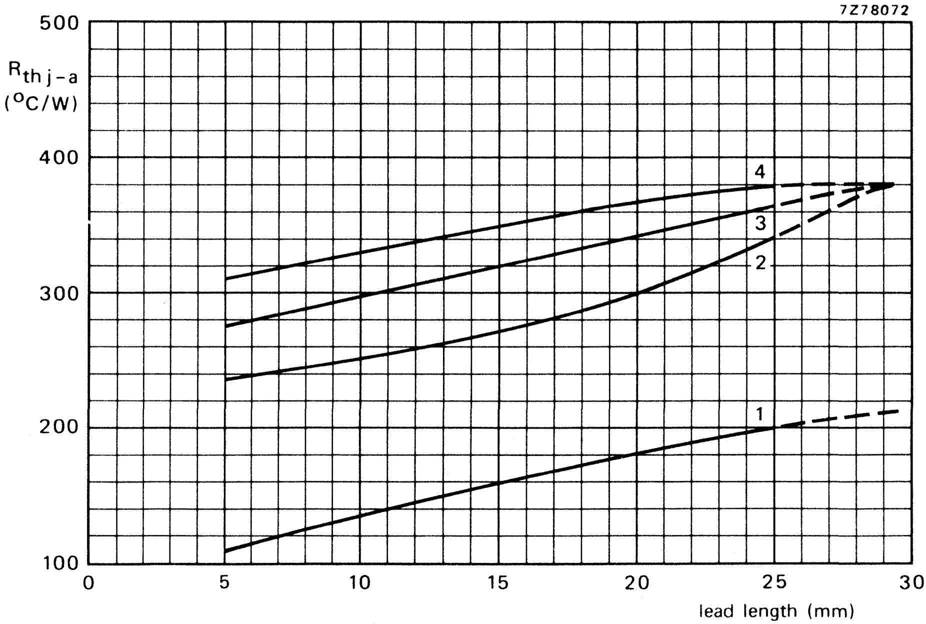


Fig. 2 Thermal resistance as a function of the lead length for various mounting.

curve	mounting
1	Infinite heatsink at end of lead.
2	Typical printed-circuit board with large area of copper (> 100 mm²).
3	Tag mounting.
4	Typical printed-circuit board with small area of copper (< 50 mm²).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BZV46–1V5	2V0	
Regulation voltage ranges I_F = 5 mA	V_F	>	1,35	2,00	V
		<	1,55	2,30	V
Temperature coefficient at I_F = 5 mA	S_F	typ.	–3,65	–5,60	mV/°C
Differential resistance at f = 1 kHz; I_F = 5 mA	r_{diff}	<	20	30	Ω
Reverse current V_R = 4 V	I_R	<	500	500	nA

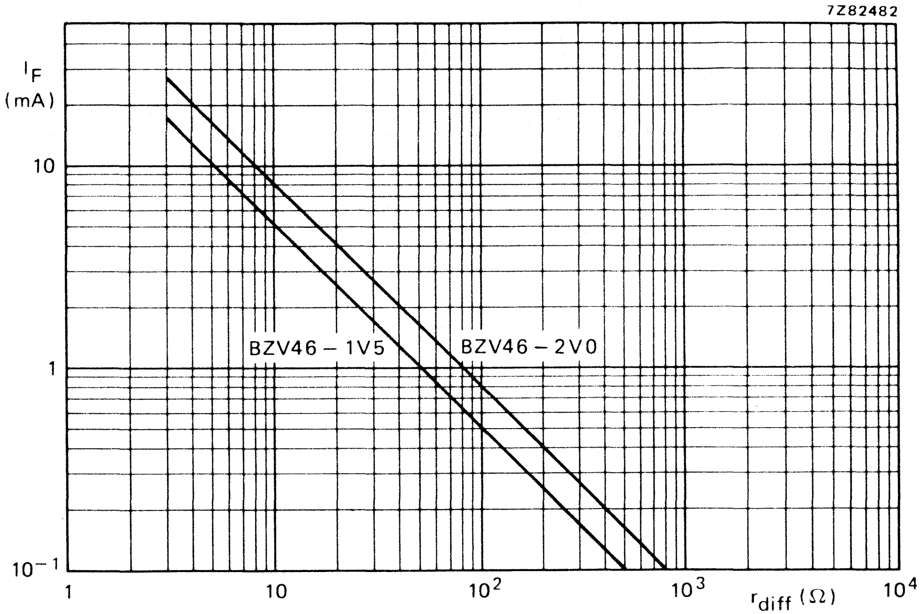


Fig. 3 Typical values; T_j = 25 °C.

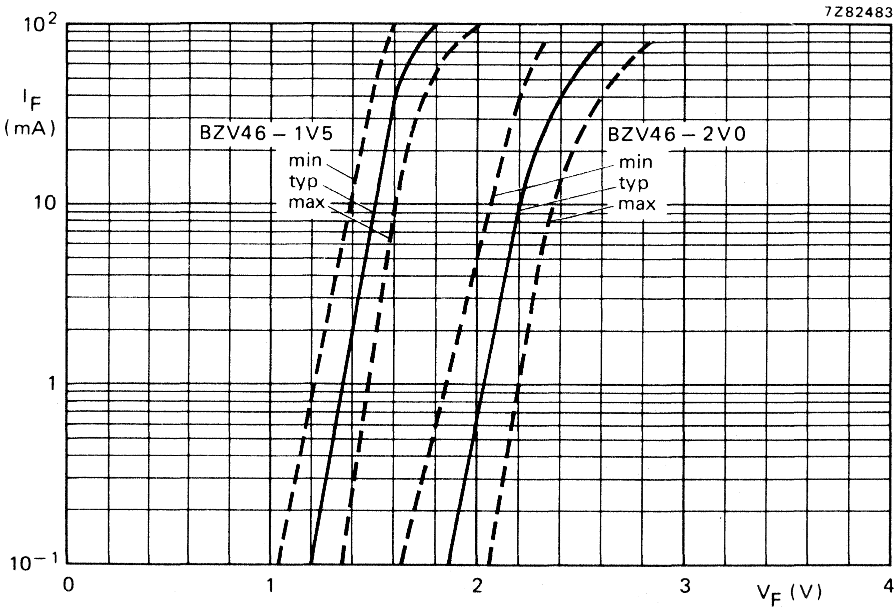


Fig. 4 Regulation characteristics at T_j = 25 °C.

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).

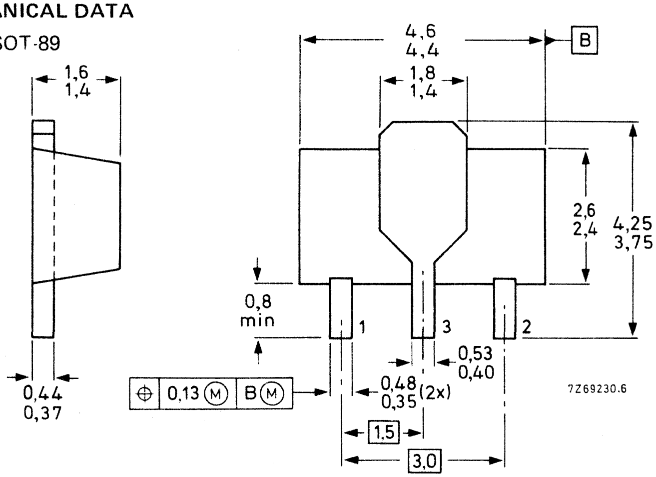
QUICK REFERENCE DATA

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

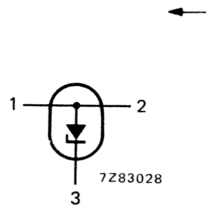
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-89



BOTTOM VIEW



Marking code

BZV49-	C2V4 = 2Y4	C5V1 = 5Y1	C12 = 12Y	C33 = 33Y
	C2V7 = 2Y7	C5V6 = 5Y6	C13 = 13Y	C36 = 36Y
	C3V0 = 3Y0	C6V2 = 6Y2	C15 = 15Y	C39 = 39Y
	C3V3 = 3Y3	C6V8 = 6Y8	C16 = 16Y	C43 = 43Y
	C3V6 = 3Y6	C7V5 = 7Y5	C18 = 18Y	C47 = 47Y
	C3V9 = 3Y9	C8V2 = 8Y2	C20 = 20Y	C51 = 51Y
	C4V3 = 4Y3	C9V1 = 9Y1	C22 = 22Y	C56 = 56Y
	C4V7 = 4Y7	C10 = 10Y	C24 = 24Y	C62 = 62Y
		C11 = 11Y	C27 = 27Y	C68 = 68Y
			C30 = 30Y	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 °C	P_{tot}	max.	1 W
Non-repetitive peak reverse power dissipation * T_j = 25 °C; t_p = 100 μs	P_{ZSM}	max.	40 W
Storage temperature	T_{stg}		−65 to +150 °C
Junction temperature	T_j	max.	150 °C

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 °C

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

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

T_j = 25 °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

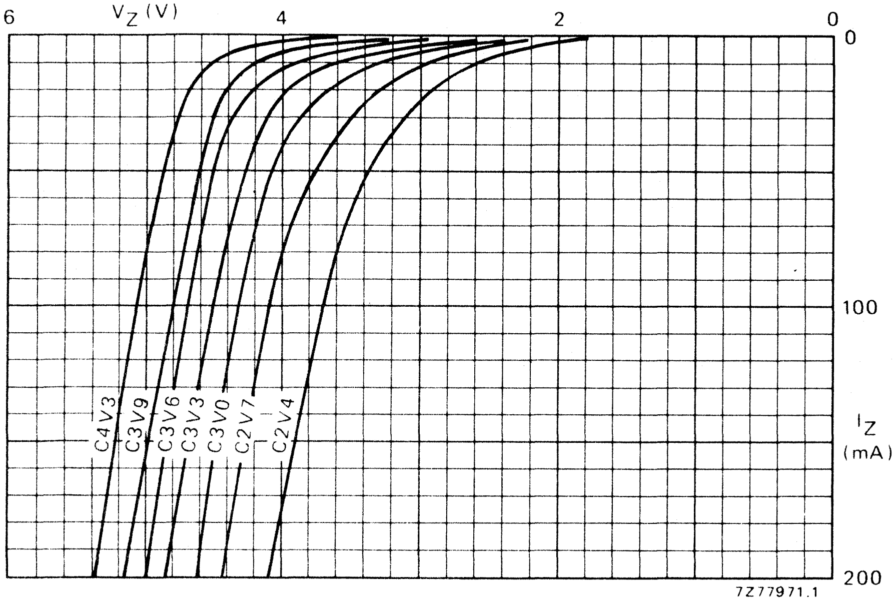


Fig. 2 Dynamic characteristics; typical values; T_j = 25 °C.

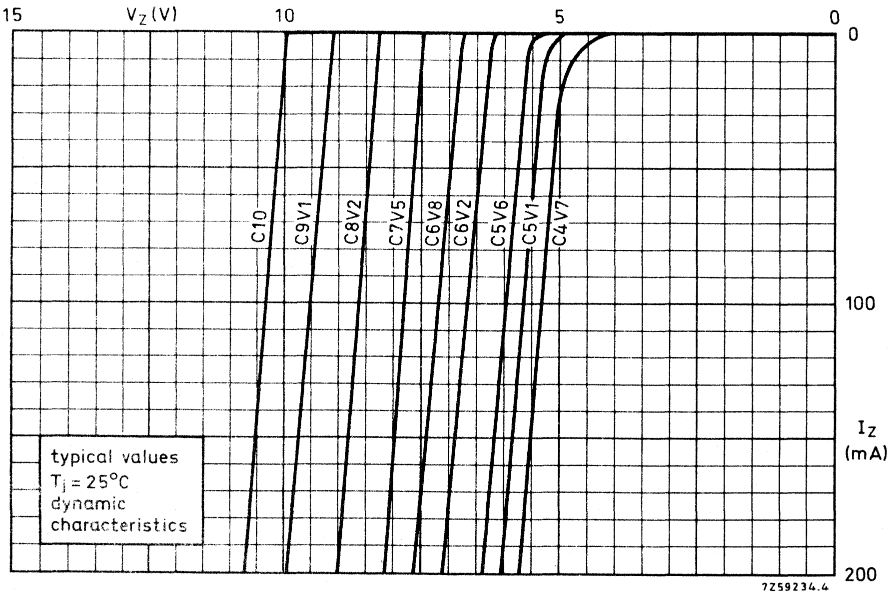


Fig. 3 Dynamic characteristics; typical values at T_j = 25 °C.

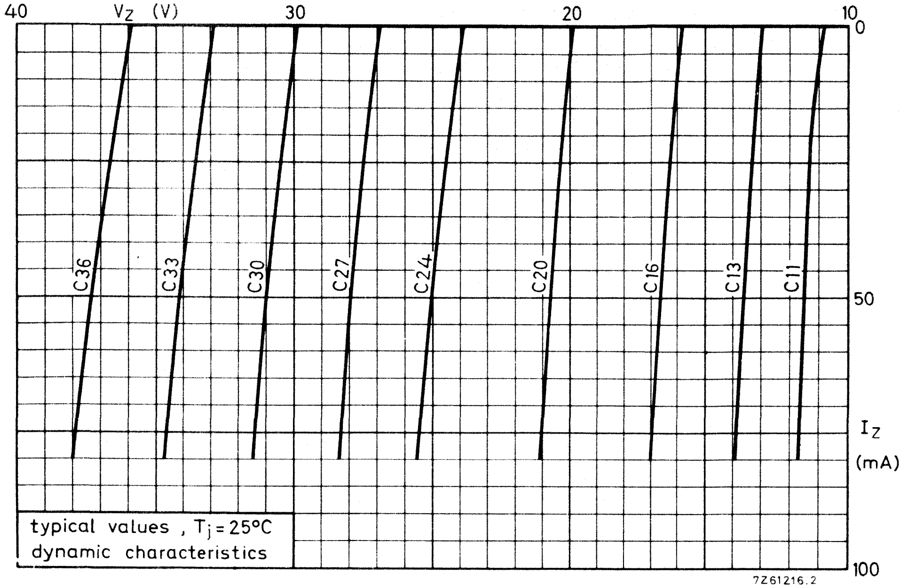


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

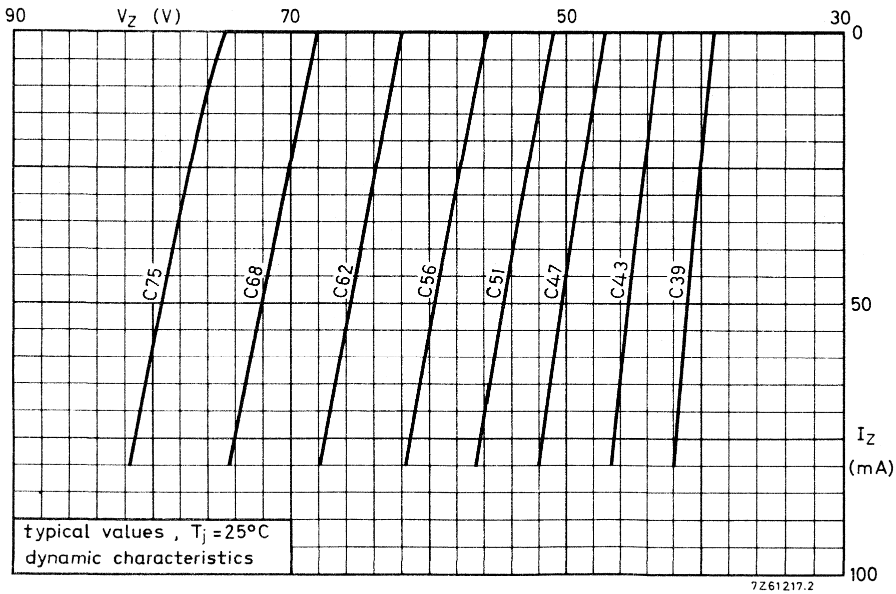


Fig. 5 Dynamic characteristics; typical values at T_j = 25 °C.

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

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

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

$$= 24 + 0{,}4 = 24{,}4\ \text{V}.$$

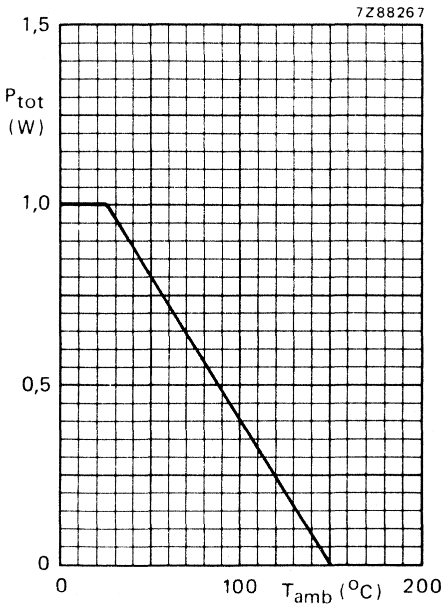


Fig. 6 Power derating curve.

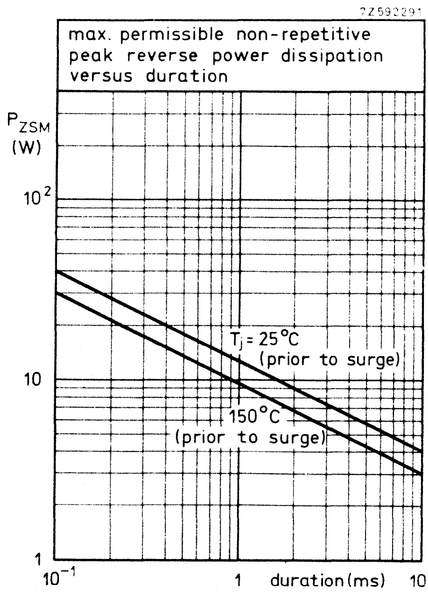


Fig. 7.

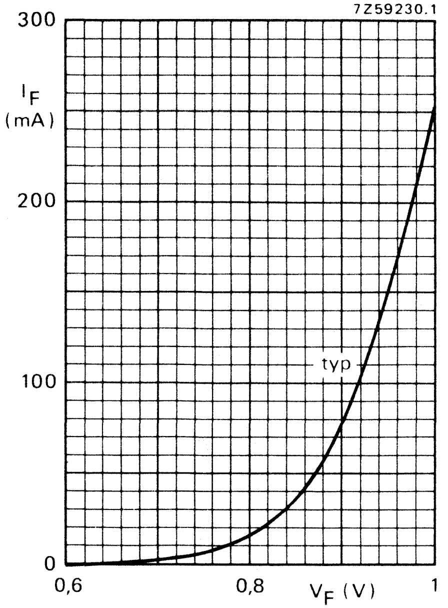


Fig. 8 T_j = 25 °C.

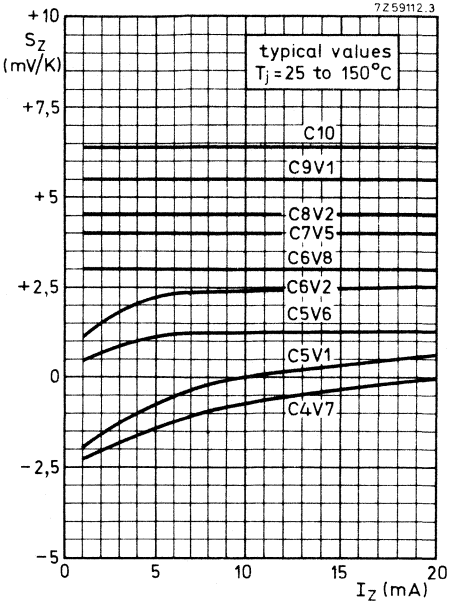


Fig. 9.

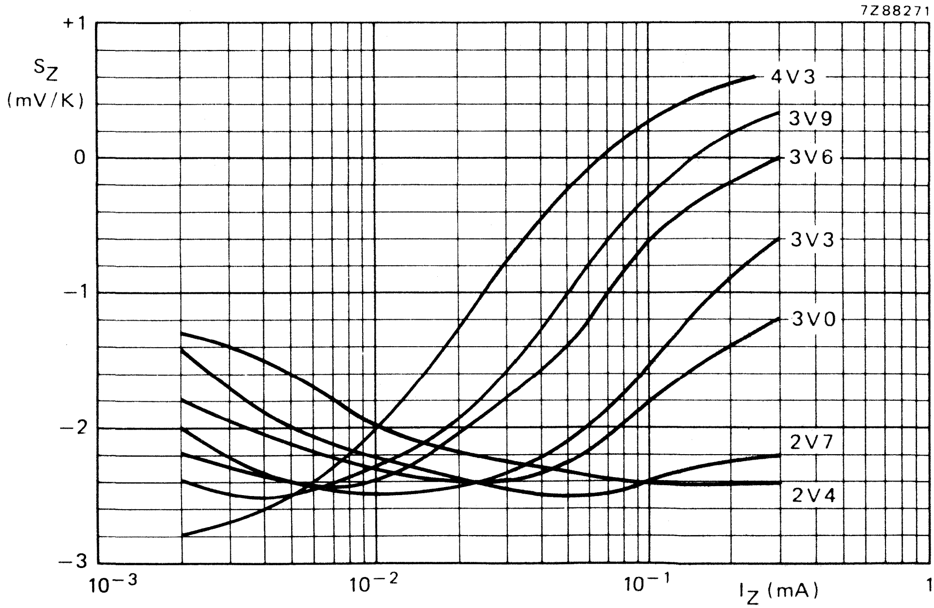


Fig. 10 Typical values temperature coefficient.

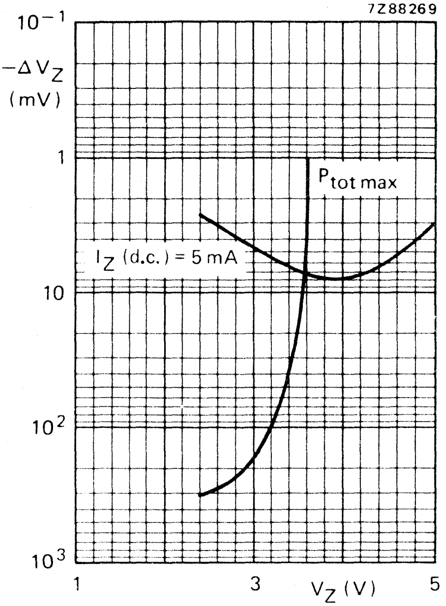


Fig. 11 Typical change of working voltage; T_j = 25 °C.

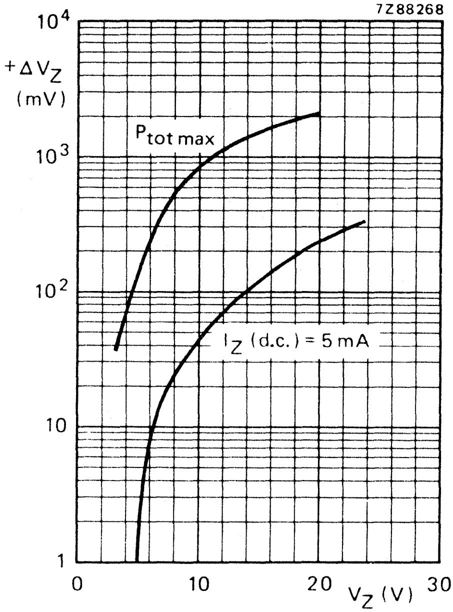


Fig. 12 Typical change of working voltage; T_{amb} = 25 °C.

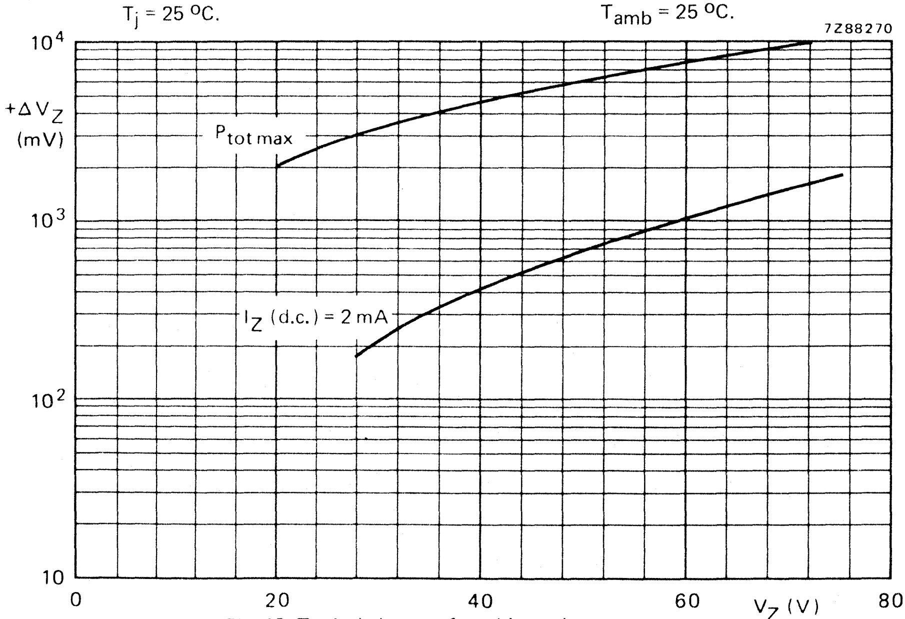


Fig. 13 Typical change of working voltage.

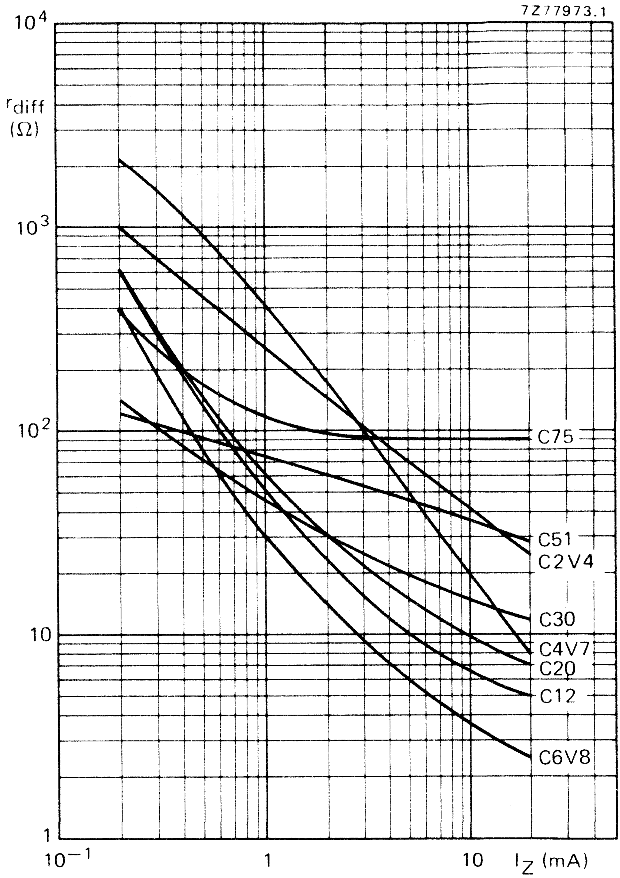


Fig. 14 Typical values; T_j = 25 °C; f = 1 kHz.

VOLTAGE REGULATOR DIODES FOR SURFACE MOUNTING

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

The SM diode is a leadless diode in an hermetically sealed glass SOD-80 envelope with tinplated metal discs at each end. It is suitable for "automatic placement" and as such it can withstand immersion soldering.

The diodes are delivered in "super 8" tape.

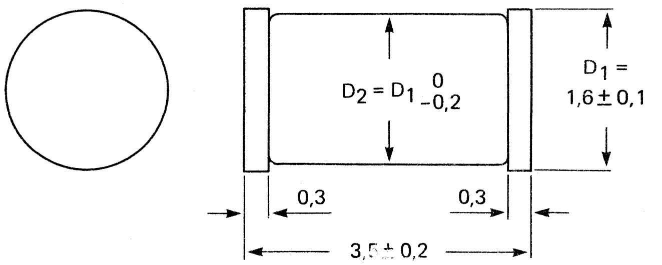
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	2,4 to 75	V
Total power dissipation up to flange temperature of 50 ^oC	P_{tot}	max.	500	mW
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	30	W
Junction temperature	T_j	max.	200	^oC
Thermal resistance from junction to tie-point	$R_{th\ j\text{-}tp}$	=	0,30	K/mW

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-80.



The BZV55 cathode is indicated by a yellow band.

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 up to T_{flange} = 50 °C	P_{tot}	max.	500 mW
up to T_{amb} = 50 °C and mounted on a ceramic substrate of 10 mm x 10 mm x 0,6 mm	P_{tot}	max.	400 mW
Non-repetitive peak reverse power dissipation t = 100 µs; T_j = 150 °C	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 (flanges)	$R_{th\ j\text{-}tp}$	=	0,30 K/mW
From junction to ambient when mounted on a ceramic substrate of 10 mm x 10 mm x 0,6 mm	$R_{th\ j\text{-}a}$	=	0,38 K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage I_F = 10 mA		V_F	<	0,9 V
Reverse current				
BZV55-.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

. = C for E24 (± 5%) tolerance

T_j = 25 °C

E24 (± 5%) logarithmic range

BZV55- ...	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) at 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	125	180
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	125	180
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	125	180
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

DEVELOPMENT SAMPLE DATA

T_j = 25 °C
E24 (± 5%) logarithmic range

BZV55- ...	working voltage V_Z (V) at I_Z = 1 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA		working voltage V_Z (V) at I_Z = 20 mA			differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	min.	nom.	max.	typ.	max.	min.	nom.	max.	typ.	max.
C2V4	1,7	1,9	2,1	275	600	2,6	2,9	3,2	25	50
C2V7	1,9	2,2	2,4	300	600	3,0	3,3	3,6	25	50
C3V0	2,1	2,4	2,7	325	600	3,3	3,6	3,9	25	50
C3V3	2,3	2,6	2,9	350	600	3,6	3,9	4,2	20	40
C3V6	2,7	3,0	3,3	375	600	3,9	4,2	4,5	20	40
C3V9	2,9	3,2	3,5	400	600	4,1	4,4	4,7	15	30
C4V3	3,3	3,6	4,0	410	600	4,4	4,7	5,1	15	30
C4V7	3,7	4,2	4,7	425	500	4,5	5,0	5,4	8	15
C5V1	4,2	4,7	5,3	400	480	5,0	5,4	5,9	6	15
C5V6	4,8	5,4	6,0	80	400	5,2	5,7	6,3	4	10
C6V2	5,6	6,1	6,6	40	150	5,8	6,3	6,8	3	6
C6V8	6,3	6,7	7,2	30	80	6,4	6,9	7,4	2,5	6
C7V5	6,9	7,4	7,9	30	80	7,0	7,6	8,0	2,5	6
C8V2	7,6	8,1	8,7	40	80	7,7	8,3	8,8	3	6
C9V1	8,4	9,0	9,6	40	100	8,5	9,2	9,7	4	8
C10	9,3	9,9	10,6	50	150	9,4	10,1	10,7	4	10
C11	10,2	10,9	11,6	50	150	10,4	11,1	11,8	5	10
C12	11,2	11,9	12,7	50	150	11,4	12,1	12,9	5	10
C13	12,3	12,9	14,0	50	170	12,5	13,1	14,2	5	15
C15	13,7	14,9	15,5	50	200	13,9	15,1	15,7	6	20
C16	15,2	15,9	17,0	50	200	15,4	16,1	17,2	6	20
C18	16,7	17,9	19,0	50	225	16,9	18,1	19,2	6	20
C20	18,7	19,9	21,1	60	225	18,9	20,1	21,4	7	20
C22	20,7	21,9	23,2	60	250	20,9	22,1	23,4	7	25
C24	22,7	23,9	25,5	60	250	22,9	24,1	25,7	7	25
	at I_Z = 0,1 mA			at I_Z = 0,5 mA		at I_Z = 10 mA			at I_Z = 10 mA	
C27	25,0	26,9	28,9	65	300	25,2	27,1	29,3	10	45
C30	27,8	29,9	32,0	70	300	28,1	30,1	32,4	15	50
C33	30,8	32,9	35,0	75	325	31,1	33,1	35,4	20	55
C36	33,8	35,9	38,0	80	350	34,1	36,1	38,4	25	60
C39	36,7	38,9	41,0	80	350	37,1	39,1	41,5	25	70
C43	39,7	42,9	46,0	85	375	40,1	43,1	46,5	25	80
C47	43,7	46,8	50,0	85	375	44,1	47,1	50,5	30	90
C51	47,6	50,8	54,0	90	400	48,1	51,1	54,6	35	100
C56	51,5	55,7	60,0	100	425	52,1	56,1	60,8	45	110
C62	57,4	61,7	66,0	120	450	58,2	62,1	67,0	60	120
C68	63,4	67,7	72,0	150	475	64,2	68,2	73,2	75	130
C75	69,4	74,7	79,0	170	500	70,3	75,3	80,2	90	140

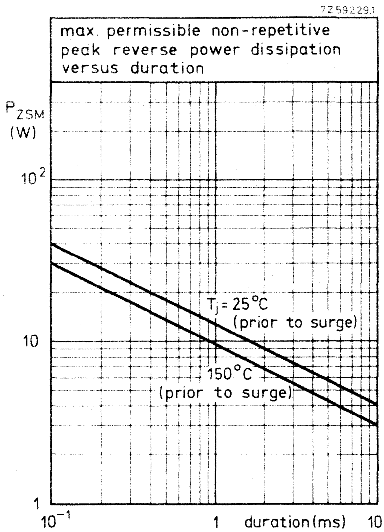

7Z59229.1
max. permissible non-repetitive
peak reverse power dissipation
versus duration
P_{ZSM}
(W)
10^2
10
1
T_j = 25 °C
(prior to surge)
150 °C
(prior to surge)
10^{-1}
1
duration (ms)
10

Fig. 2.

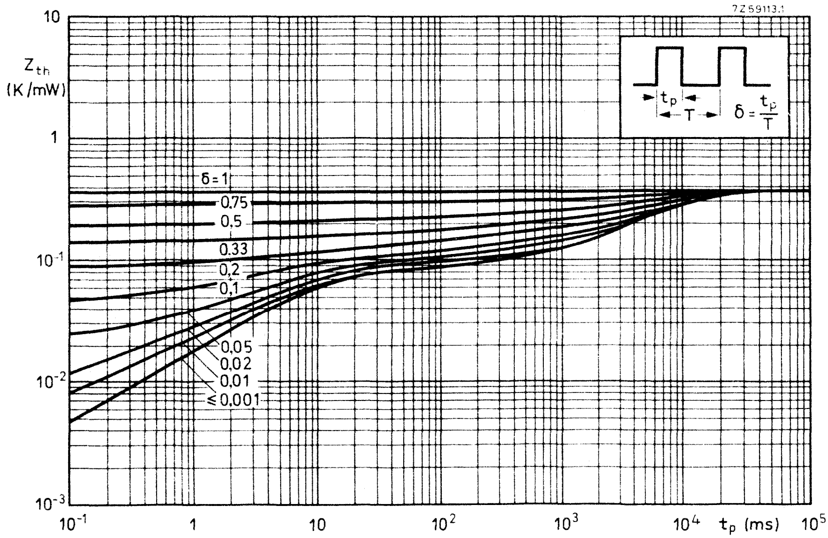

7Z59113.1
Z_{th}
(K/mW)
10
1
10^{-1}
10^{-2}
10^{-3}
δ = 1
0,75
0,5
0.33
0,2
0,1
0,05
0,02
0,01
≤ 0,001
t_p
T
$\delta = \frac{t_p}{T}$
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5

Fig. 3.

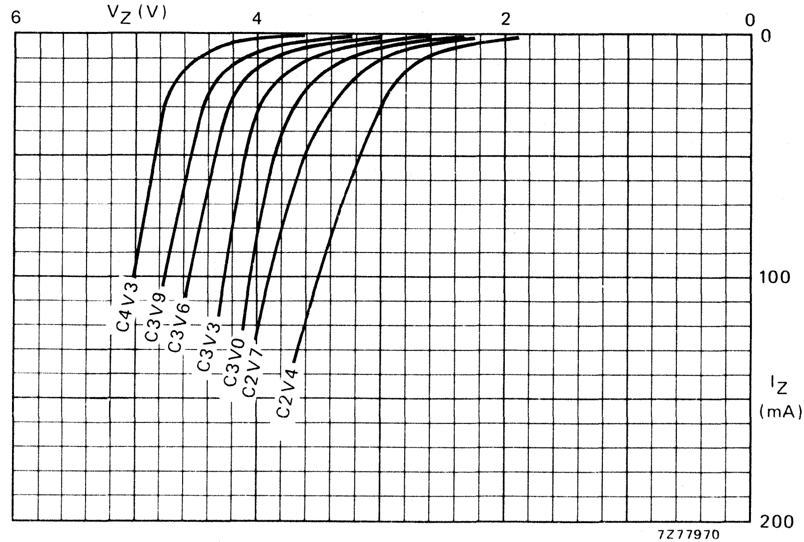


Fig. 4 Static characteristics; typical values; T_{amb} = 25 ^{o}C.

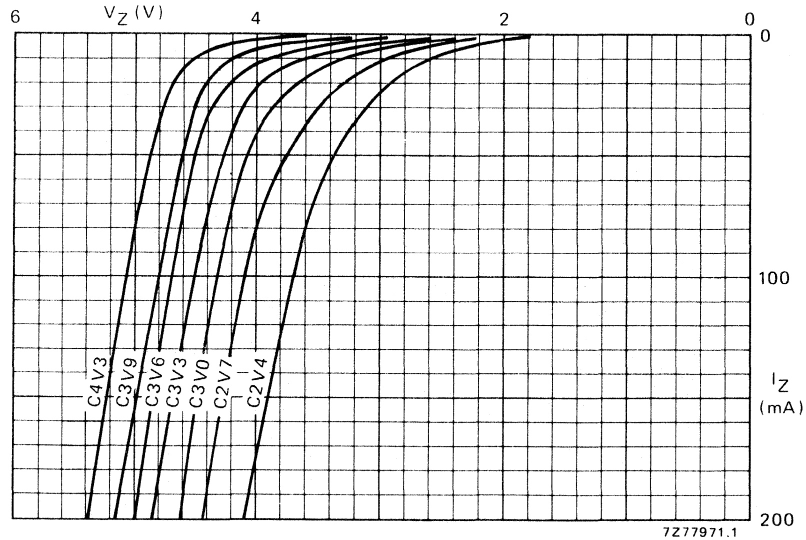


Fig. 5 Dynamic characteristics; typical values; T_j = 25 ^{o}C.

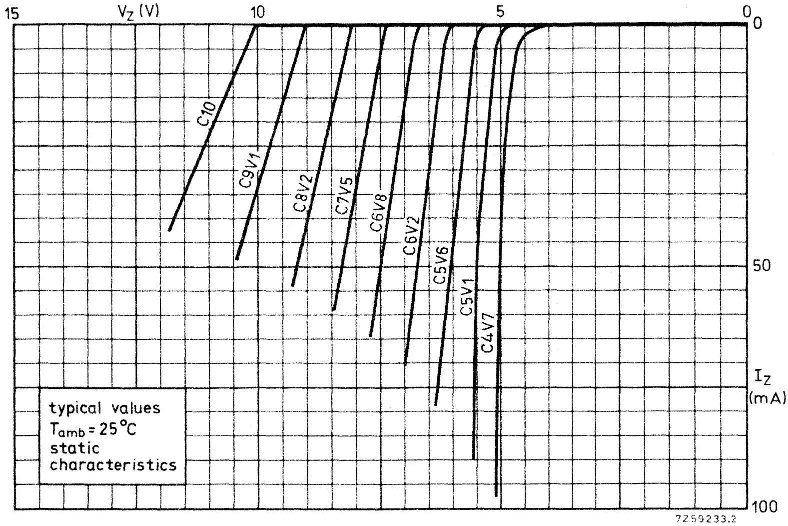

15
V_Z (V)
10
5
0
0
50
100
I_Z (mA)
C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
$T_{amb} = 25\,^{\circ}C$
static
characteristics
7Z59233.2

Fig. 6.

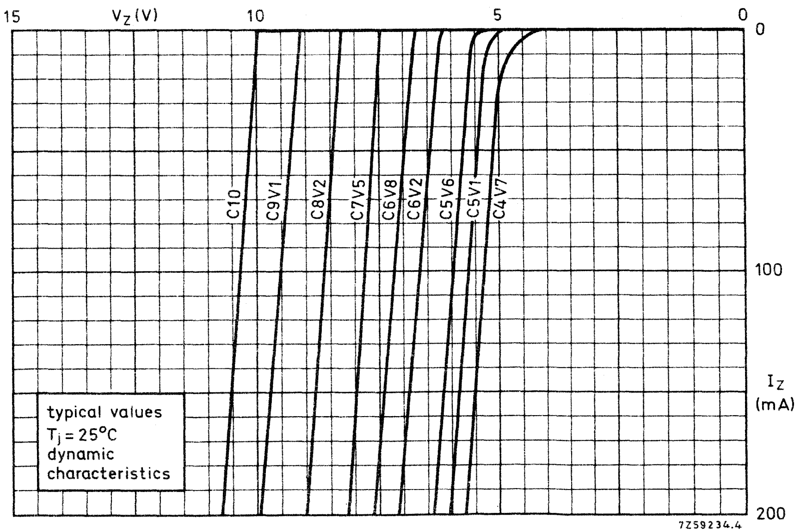

15
V_Z (V)
10
5
0
0
100
200
I_Z (mA)
C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
$T_j = 25\,^{\circ}C$
dynamic
characteristics
7Z59234.4

Fig. 7.

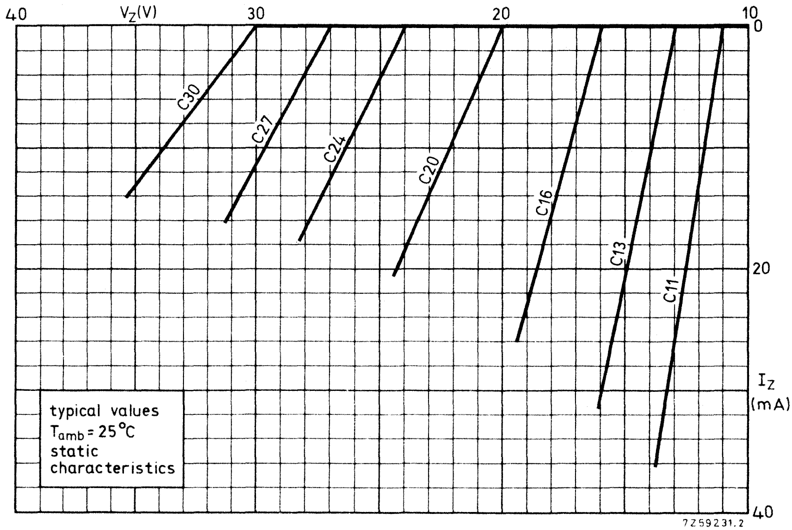

40
V_Z(V)
30
20
10
0
C30
C27
C24
C20
C16
C13
C11
20
I_Z
(mA)
40
typical values
T_{amb} = 25 °C
static
characteristics
7Z59231.2

Fig. 8.

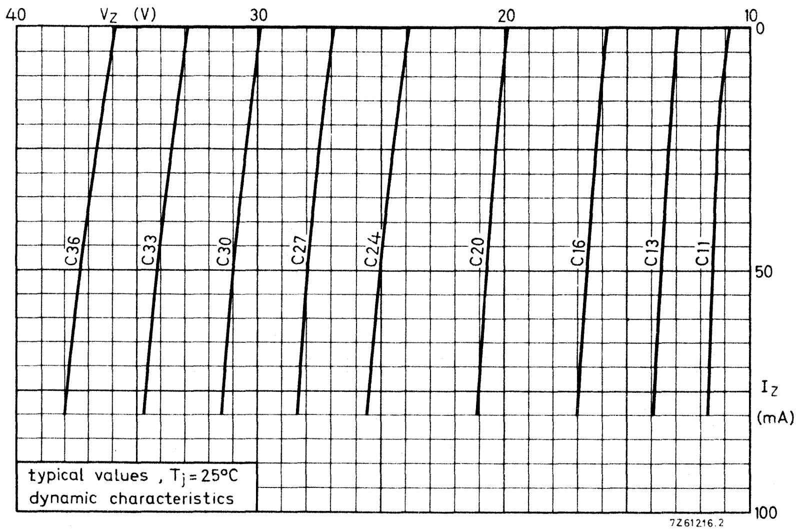

40
V_Z (V)
30
20
10
0
C36
C33
C30
C27
C24
C20
C16
C13
C11
50
I_Z
(mA)
100
typical values , T_j = 25 °C
dynamic characteristics
7Z61216.2

Fig. 9.

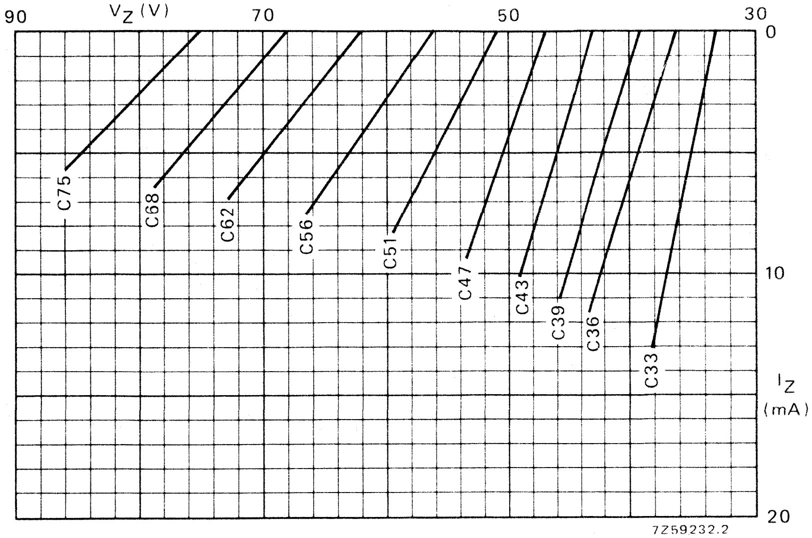


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

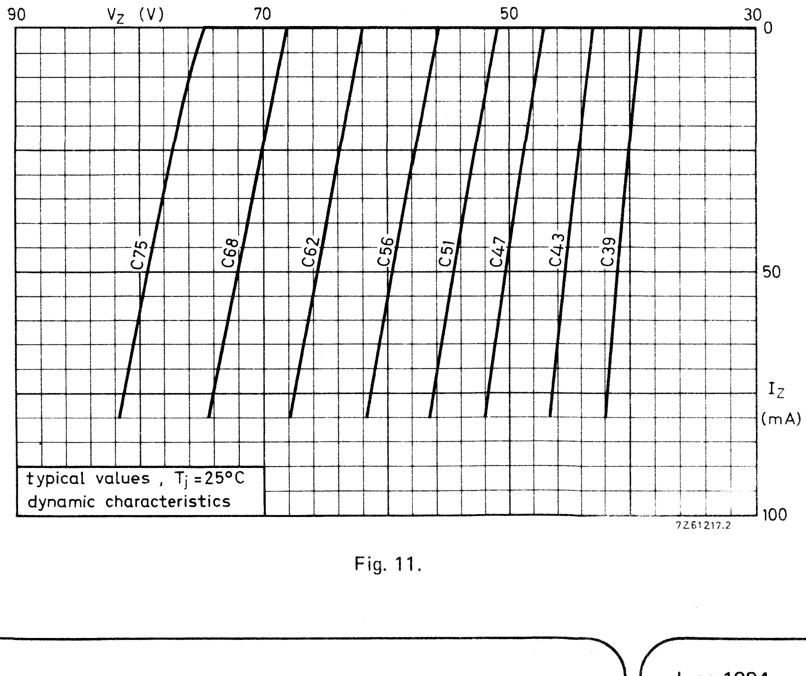


Fig. 11.

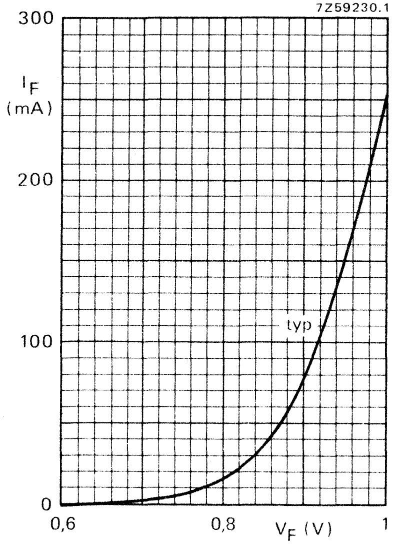


Fig. 12 $T_j = 25\ ^oC$.

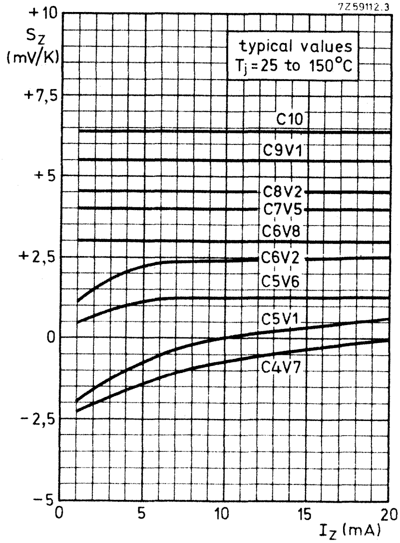


Fig. 13.

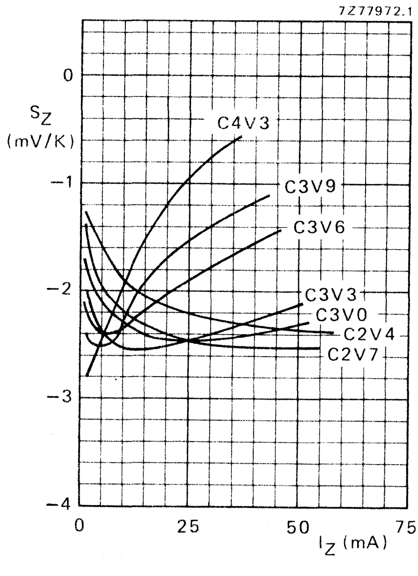


Fig. 14 Typical values; $T_j = 25$ to $150\ ^oC$.

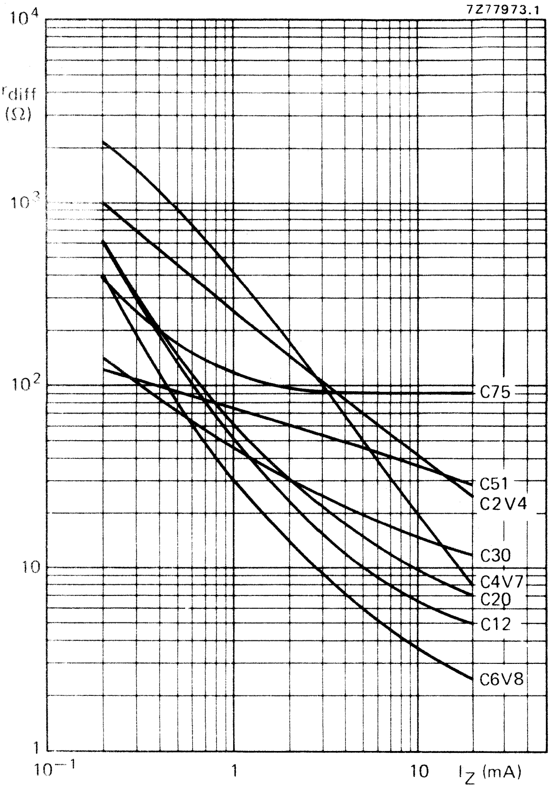


Fig. 15 Typical values; T_j = 25 °C; f = 1 kHz.

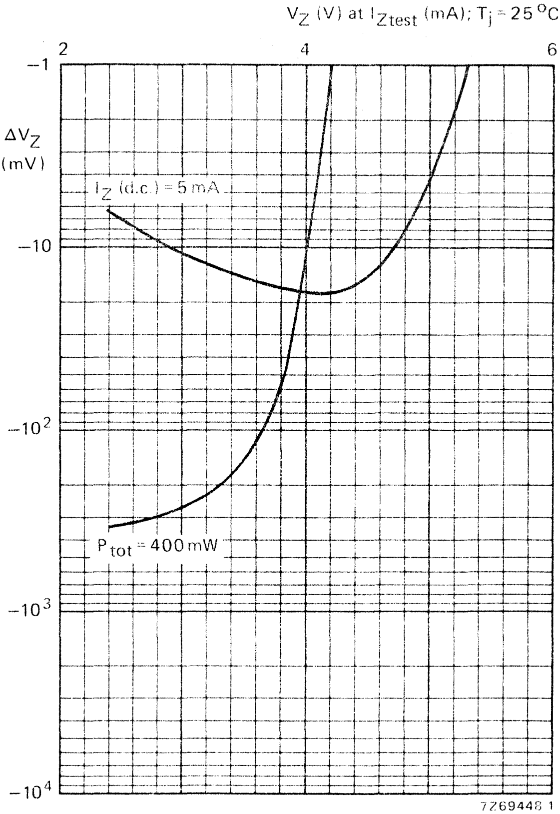


Fig. 16 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

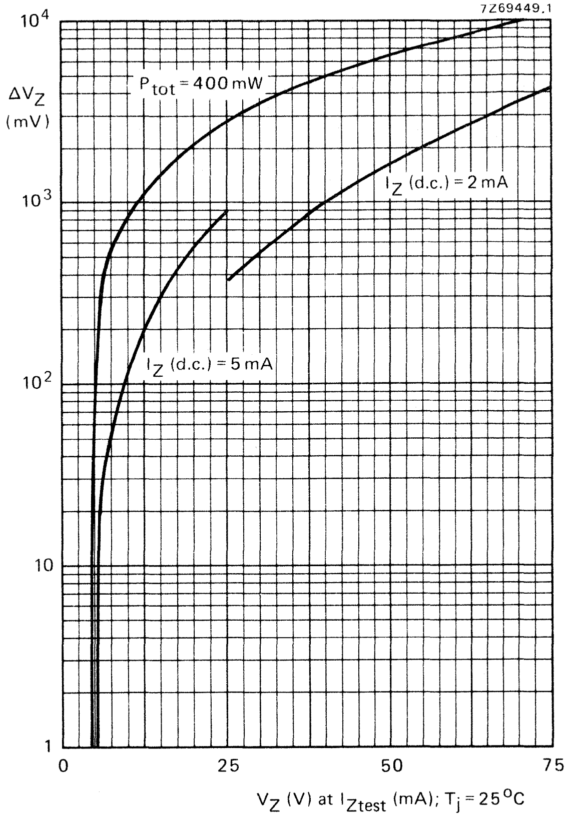


Fig. 17 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

VOLTAGE REGULATOR DIODES

Silicon planar voltage regulator diodes in hermetically sealed DO-41 glass envelopes intended for stabilization purposes. The series covers the normalized E24 (± 5%) range of nominal working voltages ranging from 3,6 V to 75 V.

QUICK REFERENCE DATA

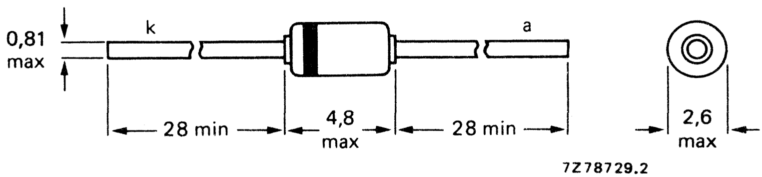
Working voltage range	V_Z	nom.	3,6 to 75	V
Total power dissipation	P_{tot}	max.	1,3	W*
Non-repetitive peak reverse power dissipation t_p = 100 μs; T_j = 25 °C	P_{ZSM}	max.	60	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to tie-point	$R_{th\ j\text{-}tp}$	=	110	K/W*

* If leads are kept at T_{tp} = 55 °C at 4 mm from body.

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-41 (SOD-66).



Cathode indicated by coloured band.

Products approved to CECC 50 005-010 available on request.

RATINGS

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

Working current (d.c.)	I_Z	limited by $P_{tot\,max}$
Non-repetitive peak reverse current t_p = 10 ms; half sine-wave; T_{amb} = 25 °C	I_{ZSM}	see table below
Repetitive peak forward current	I_{FRM}	max. 250 mA
Total power dissipation (see also Fig. 2)	P_{tot}	max. 1,30 W* max. 1 W**
Non-repetitive peak reverse power dissipation t_p = 100 μs; T_j = 25 °C	P_{ZSM}	max. 60 W
Storage temperature	T_{stg}	−65 to + 200 °C
Junction temperature	T_j	max. 200 °C

THERMAL RESISTANCE

From junction to tie-point	$R_{th\,j\text{-}tp}$	= 110 K/W*
From junction to ambient mounted on a printed-circuit board	$R_{th\,j\text{-}a}$	= 175 K/W**

BZV85—. . . .	Non-repetitive peak reverse current I_{ZSM} (mA) max.
C3V6	2000
C3V9	1950
C4V3	1850
C4V7	1800
C5V1	1750
C5V6	1700
C6V2	1620
C6V8	1550
C7V5	1500
C8V2	1400
C9V1	1340
C10	1200
C11	1100
C12	1000
C13	900
C15	760
C16	700

BZV85—. . .	Non-repetitive peak reverse current I_{ZSM} (mA) max.
C18	600
C20	540
C22	500
C24	450
C27	400
C30	380
C33	350
C36	320
C39	296
C43	270
C47	246
C51	226
C56	208
C62	186
C68	171
C75	161

* If the temperature of the leads at 4 mm from the body are kept up to T_{tp} = 55 °C.

** Measured in still air up to T_{amb} = 25 °C and mounted on printed-circuit board with lead length of 10 mm and print copper area of 1 cm^2 per lead.

CHARACTERISTICS

T_j = 25 °C

Forward voltage at I_F = 50 mA V_F < 1,0 V

BZV85—....	working voltage E24 (± 5%) V_Z (V) at I_{Ztest}			test current I_{Ztest} (mA)	differential resistance r_{diff} (Ω) at I_{Ztest}	temperature coefficient S_Z (mV/K) at I_{Ztest}		reverse current I_R (μA) at V_R	test voltage V_R (V)
	min.	nom.	max.		max.	min.	max.	max.	
C3V6	3,4	3,6	3,8	60	15	–3,5	–1,0	50	1,0
C3V9	3,7	3,9	4,1	60	15	–3,5	–1,0	10	1,0
C4V3	4,0	4,3	4,6	50	13	–2,7	0	5	1,0
C4V7	4,4	4,7	5,0	45	13	–2,0	0,7	3	1,0
C5V1	4,8	5,1	5,4	45	10	–0,5	2,2	3	2,0
C5V6	5,2	5,6	6,0	45	7	0	2,7	2	2,0
C6V2	5,8	6,2	6,6	35	4	0,6	3,6	2	3,0
C6V8	6,4	6,8	7,2	35	3,5	1,3	4,3	2	4,0
C7V5	7,0	7,5	7,9	35	3	2,5	5,5	1	4,5
C8V2	7,7	8,2	8,7	25	5	3,1	6,1	0,7	5,0
C9V1	8,5	9,1	9,6	25	5	3,8	7,2	0,7	6,5
C10	9,4	10	10,6	25	8	4,7	8,5	0,2	7,0
C11	10,4	11	11,6	20	10	5,3	9,3	0,2	7,7
C12	11,4	12	12,7	20	10	6,3	10,8	0,2	8,4
C13	12,4	13	14,1	20	10	7,4	12,0	0,2	9,1
C15	13,8	15	15,6	15	15	8,9	13,6	0,05	10,5
C16	15,3	16	17,1	15	15	10,7	15,4	0,05	11,0
C18	16,8	18	19,1	15	20	11,8	17,1	0,05	12,5
C20	18,8	20	21,2	10	24	13,6	19,1	0,05	14,0
C22	20,8	22	23,3	10	25	16,6	22,1	0,05	15,5
C24	22,8	24	25,6	10	30	18,3	24,3	0,05	17
C27	25,1	27	28,9	8	40	20,1	27,5	0,05	19
C30	28	30	32	8	45	22,4	32,0	0,05	21
C33	31	33	35	8	45	24,8	35,0	0,05	23
C36	34	36	38	8	50	27,2	39,9	0,05	25
C39	37	39	41	6	60	29,6	43,0	0,05	27
C43	40	43	46	6	75	34,0	48,3	0,05	30
C47	44	47	50	4	100	37,4	52,5	0,05	33
C51	48	51	54	4	125	40,8	56,5	0,05	36
C58	52	56	60	4	150	46,8	63,0	0,05	39
C62	58	62	66	4	175	52,2	72,5	0,05	43
C68	64	68	72	4	200	60,5	81,0	0,05	48
C75	70	75	80	4	225	66,5	88,0	0,05	53

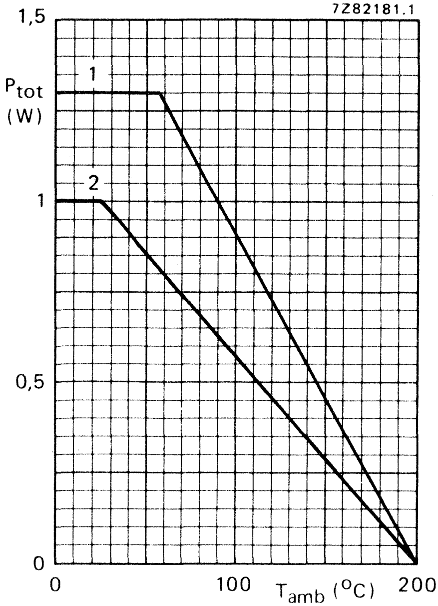


Fig. 2 Maximum permissible power dissipation versus ambient temperature.

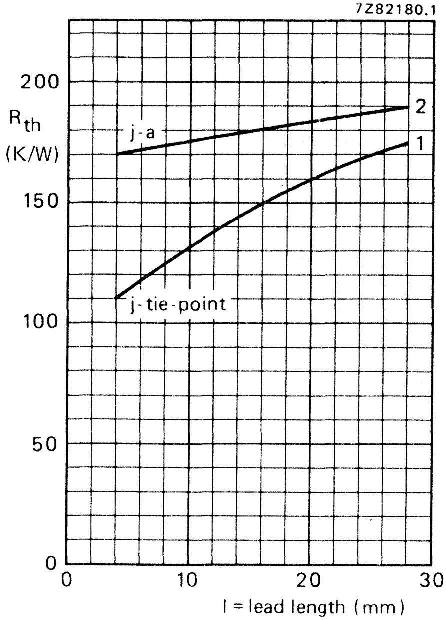
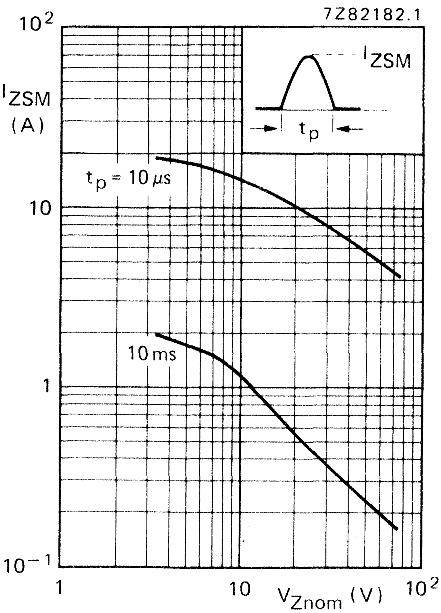


Fig. 3 Thermal resistance versus lead length.



Mounting methods (see Figs 2 and 3)

1. To tie-points (lead length = 4 mm in Fig. 2).
2. Mounted on a printed-circuit board (with lead length of 10 mm in Fig. 2) and print copper area of 1 cm^2 per lead.

Fig. 4 Half sine-wave; T_{amb} = 25 °C.

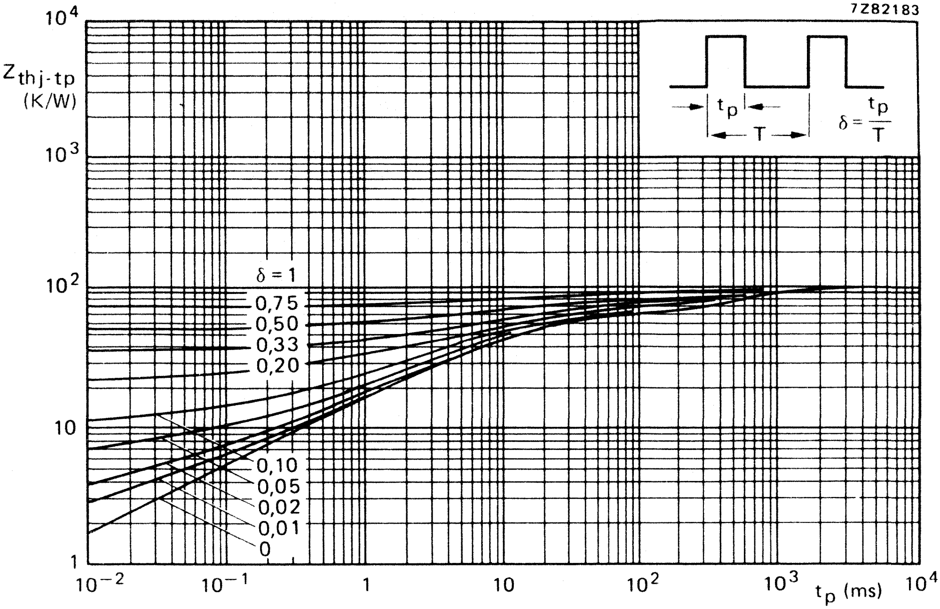


Fig. 5 Thermal impedance from junction to tie-point with a lead length of 4 mm.

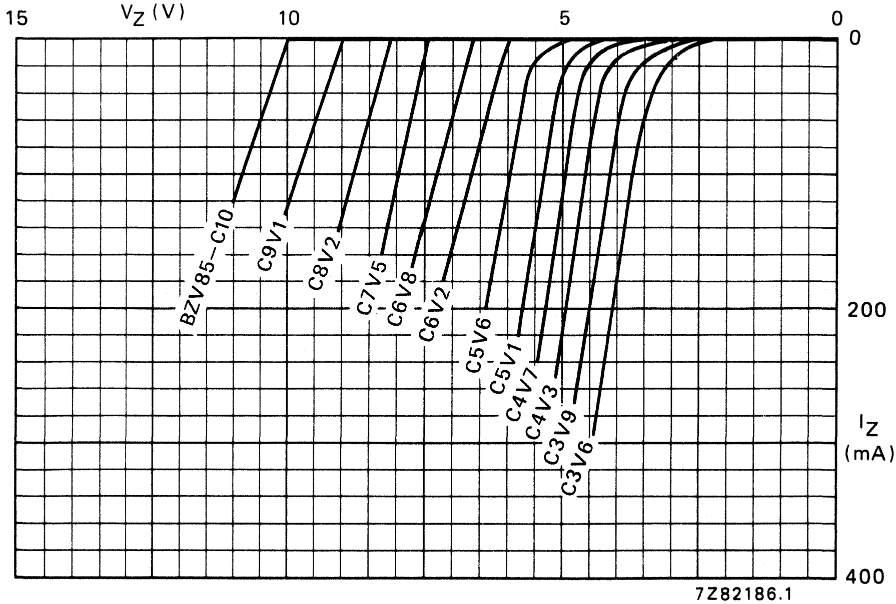


Fig. 6 Static characteristics; typical values; T_{amb} = 25 °C.

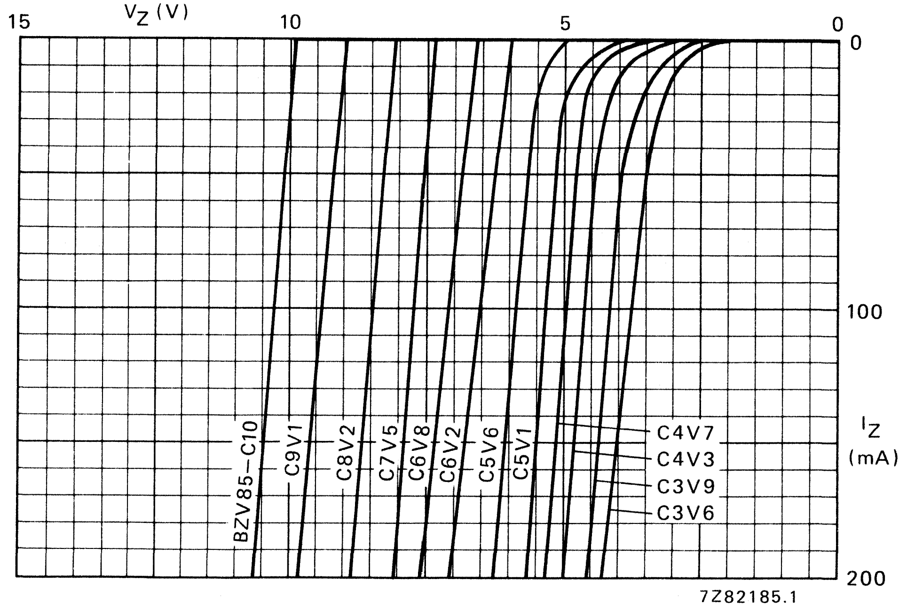


Fig. 7 Dynamic characteristics; typical values; T_j = 25 °C.

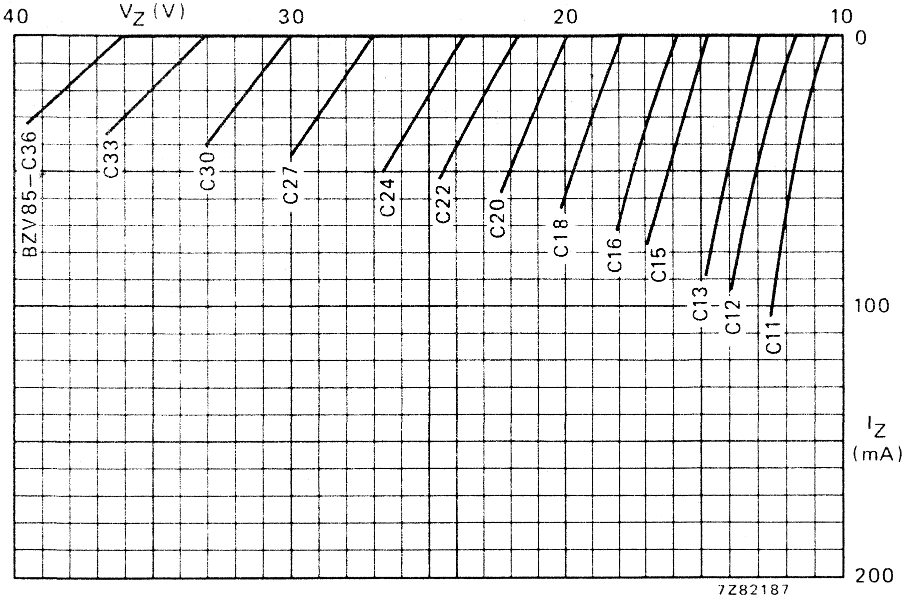


Fig. 8 Static characteristics; typical values; T_{amb} = 25 °C.

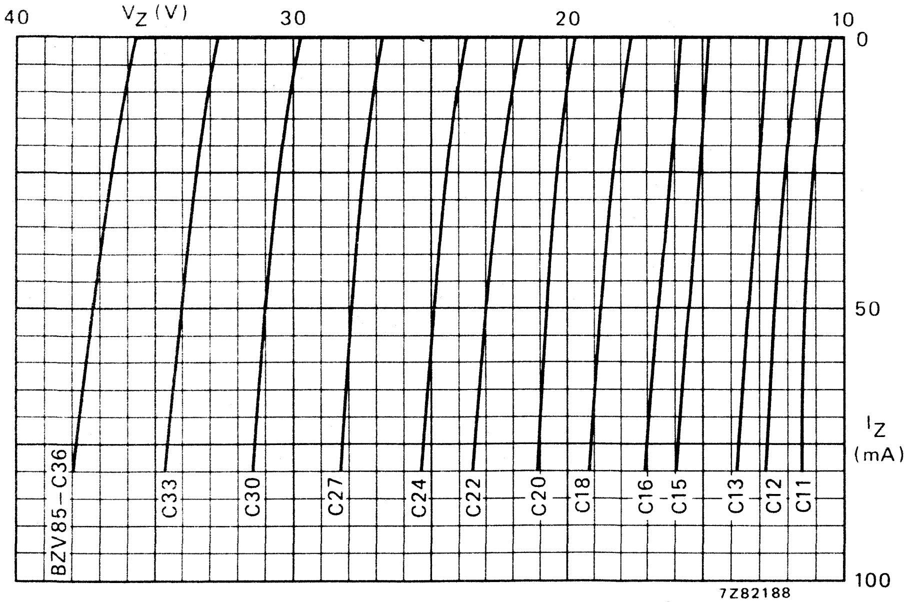


Fig. 9 Dynamic characteristics; typical values; T_j = 25 °C.

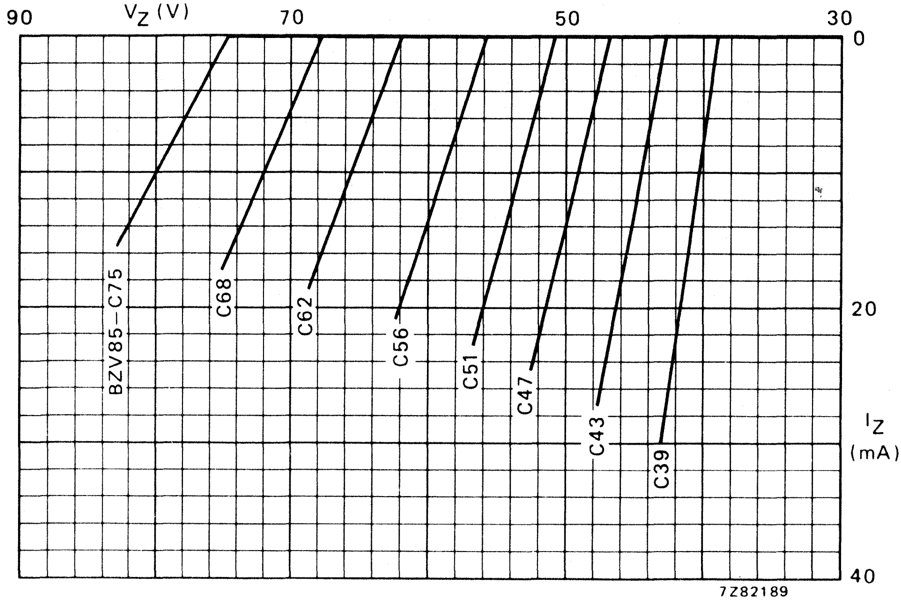


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

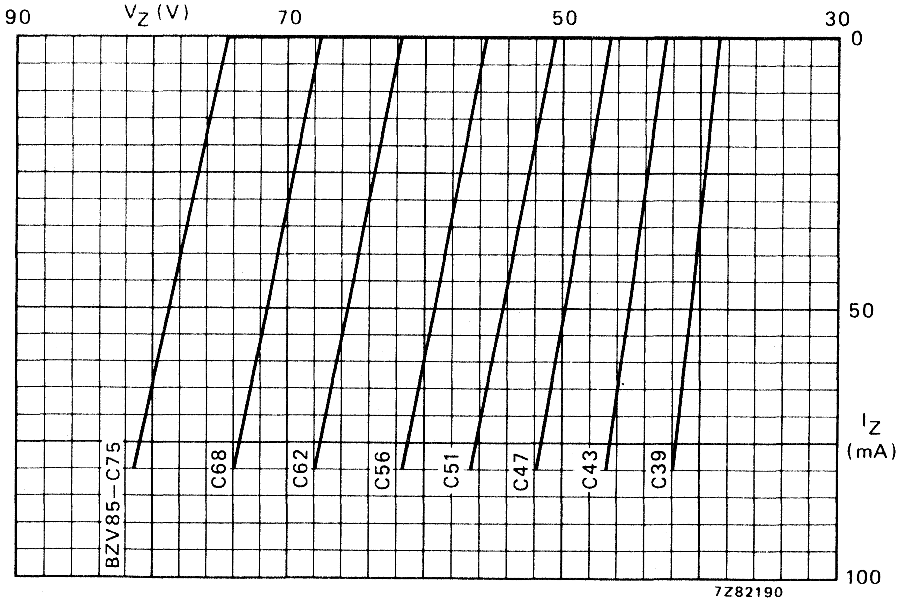


Fig. 11 Dynamic characteristics; typical values; T_j = 25 °C.

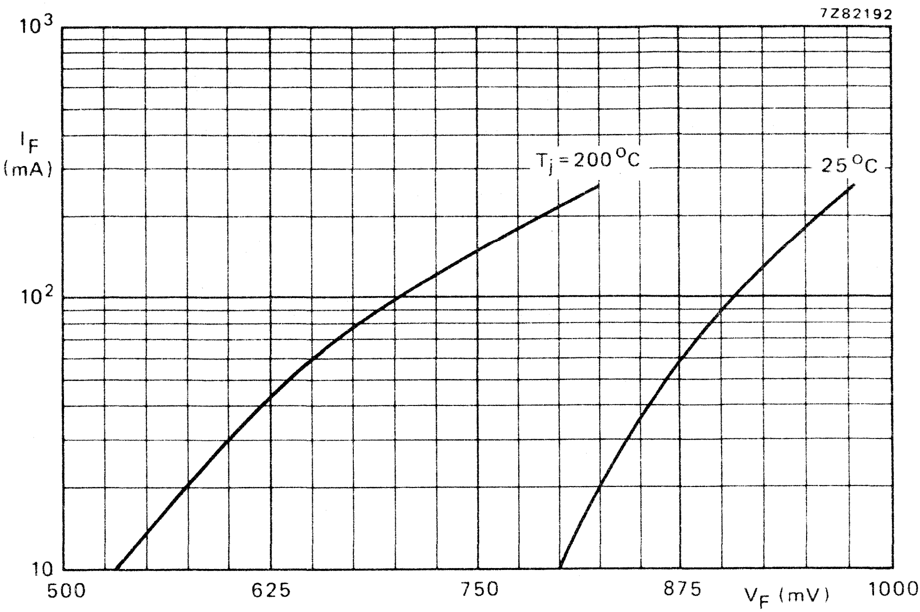


Fig. 12 Typical values.

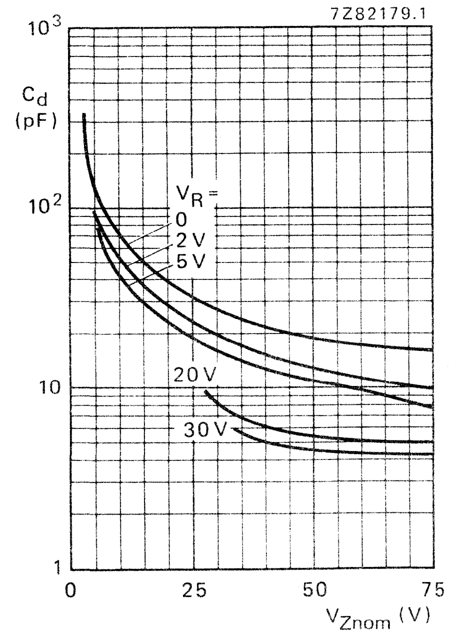


Fig. 13 f = 1 MHz; T_j = 25 ^oC; typical values.

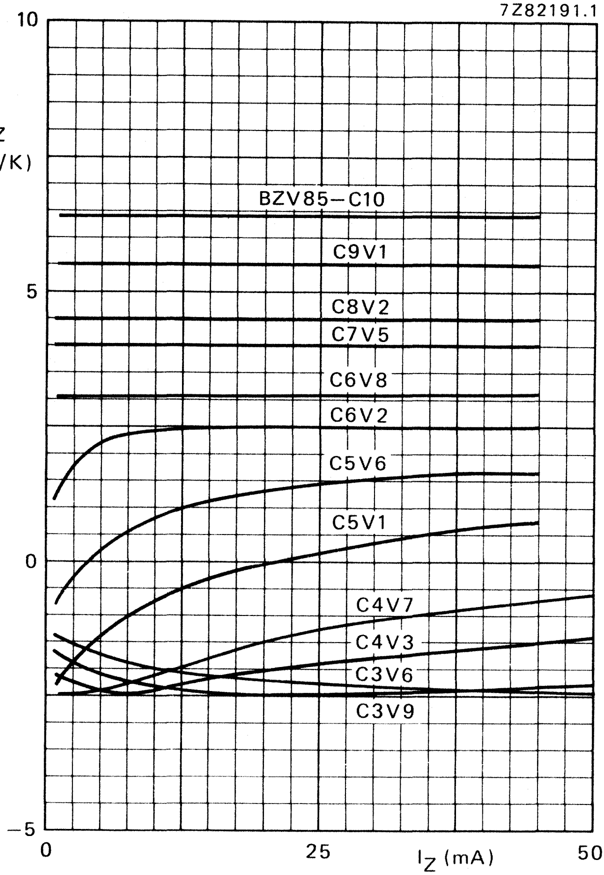


Fig. 14 T_j = 25 °C to 150 °C; typical values.

For types above 7,5 V the temperature coefficient is independent of current and can be read from the table („CHARACTERISTICS")

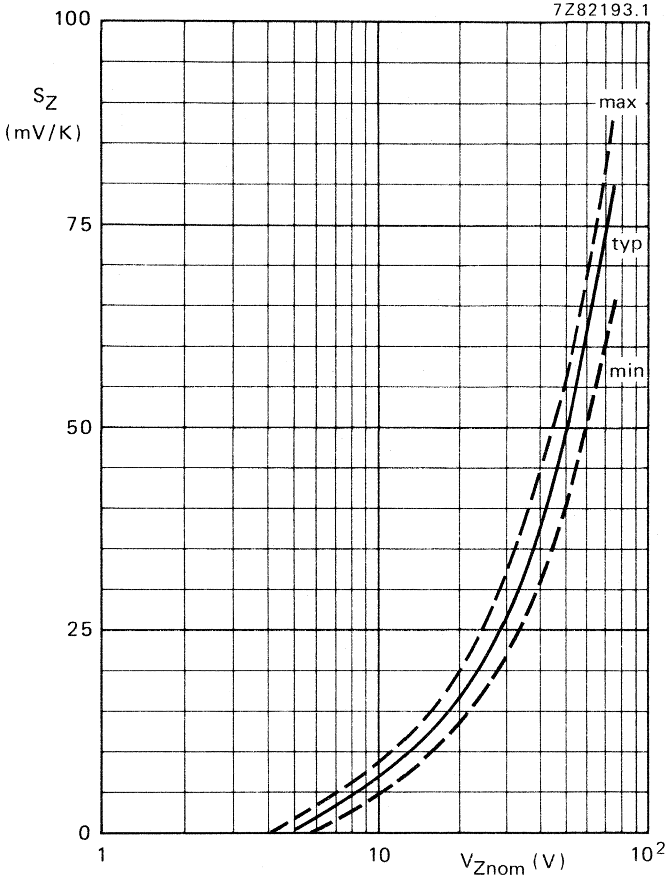


Fig. 15 $I_Z = I_{Ztest}$; T_j = 25 °C to 150 °C.

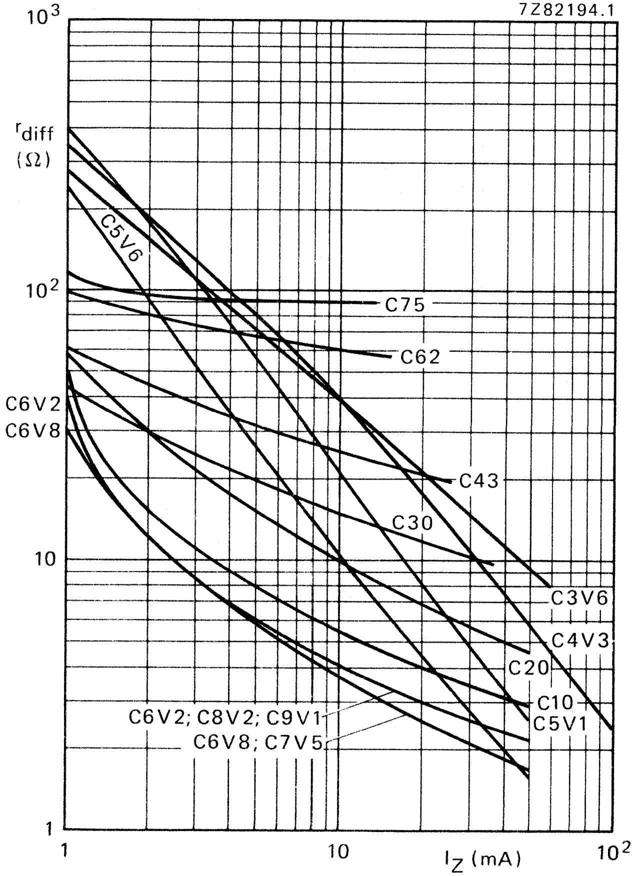


Fig. 16 f = 1 kHz; T_j = 25 °C; typical values.

REGULATOR DIODES

Glass passivated diodes in hermetically sealed axial-leaded glass envelopes. They are intended for use as voltage regulator and transient suppressor diode in medium power regulation and transient suppression circuits.

The series consists of BZW03-C7V5 to BZW03-C270 in the normalized E24 (± 5%) range.

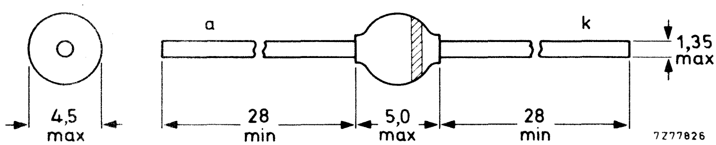
QUICK REFERENCE DATA

			voltage regulator	transient suppressor	
Working voltage range	V_Z	nom.	7,5 to 270		V
Stand-off voltage	V_R			6,2 to 220	V
Total power dissipation	P_{tot}	max.	6		W
Non-repetitive peak reverse power dissipation T_j = 25 °C; t_p = 100 μs	P_{RSM}			1000	W

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

Total power dissipation			
T_{tp} = 25 °C; lead length 10 mm	P_{tot}	max.	6 W
T_{amb} = 45 °C; p.c.b. mounting (Fig. 2)	P_{tot}	max.	1,75 W
Repetitive peak reverse power dissipation	P_{ZRM}	max.	20 W
Non-repetitive peak reverse power dissipation			
t_p = 100 μs square pulse; T_j = 25 °C (prior to surge)	P_{RSM}	max.	1000 W
waveform 10/1000 exponential pulse (see Fig. 3), T_j = 25 °C (prior to surge)	P_{RSM}	max.	500 W
Storage temperature	T_{stg}		−65 to +175 °C
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	25 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ≥ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	75 K/W

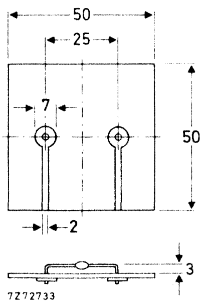


Fig. 2 Mounted on a printed-circuit board.

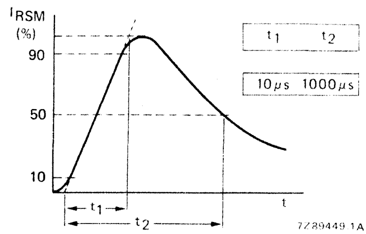


Fig. 3 Current pulse according to IEC 60-2, Section 6.

CHARACTERISTICS

Forward voltage I_F = 1 A; T_j = 25 °C	V_F	<	1,2 V

CHARACTERISTICS when used as voltage regulator diodes; T_j = 25 °C

	working voltage V_Z V			differential resistance r_{diff} Ω		temperature coefficient S_Z %/K		test current I_Z mA	reverse current I_R μA at	reverse voltage V_R V
BZW03-	min.	typ.	max.	typ.	max.	min.	max.		max.	
C7V5	7,0	7,5	7,9	0,7	1,5	0	0,07	175	1500	5,6
C8V2	7,7	8,2	8,7	0,8	1,5	0,03	0,08	150	1200	6,2
C9V1	8,5	9,1	9,6	0,9	2,0	0,03	0,08	150	40	6,8
C10	9,4	10,0	10,6	1,0	2,0	0,05	0,09	125	20	7,5
C11	10,4	11,0	11,6	1,1	2,5	0,05	0,10	125	15	8,2
C12	11,4	12,0	12,7	1,1	2,5	0,05	0,10	100	10	9,1
C13	12,4	13,0	14,1	1,2	2,5	0,05	0,10	100	4	10
C15	13,8	15,0	15,6	1,2	2,5	0,05	0,10	75	2	11
C16	15,3	16,0	17,1	1,3	2,5	0,06	0,11	75	2	12
C18	16,8	18,0	19,1	1,3	2,5	0,06	0,11	65	2	13
C20	18,8	20,0	21,2	1,5	3	0,06	0,11	65	2	15
C22	20,8	22,0	23,3	1,6	3,5	0,06	0,11	50	2	16
C24	22,8	24,0	25,6	1,8	3,5	0,06	0,11	50	2	18
C27	25,1	27,0	28,9	2,5	5	0,06	0,11	50	2	20
C30	28	30	32	4	8	0,06	0,11	40	2	22
C33	31	33	35	5	10	0,06	0,11	40	2	24
C36	34	36	38	6	11	0,06	0,11	30	2	27
C39	37	39	41	7	14	0,06	0,11	30	2	30
C43	40	43	46	10	20	0,07	0,12	30	2	33
C47	44	47	50	12	25	0,07	0,12	25	2	36
C51	48	51	54	14	27	0,07	0,12	25	2	39
C56	52	56	60	18	35	0,07	0,12	20	2	43
C62	58	62	66	20	42	0,08	0,13	20	2	47
C68	64	68	72	22	44	0,08	0,13	20	2	51
C75	70	75	79	25	45	0,08	0,13	20	2	56
C82	77	82	87	30	65	0,08	0,13	15	2	62
C91	85	91	96	40	75	0,09	0,13	15	2	68
C100	94	100	106	45	90	0,09	0,13	12	2	75
C110	104	110	116	65	125	0,09	0,13	12	2	82
C120	114	120	127	90	170	0,09	0,13	10	2	91
C130	124	130	141	100	190	0,09	0,13	10	2	100
C150	138	150	156	150	330	0,09	0,13	8	2	110
C160	153	160	171	180	350	0,09	0,13	8	2	120
C180	168	180	191	210	430	0,09	0,13	5	2	130
C200	188	200	212	250	500	0,09	0,13	5	2	150
C220	208	220	233	350	700	0,09	0,13	5	2	160
C240	228	240	256	450	900	0,09	0,13	5	2	180
C270	251	270	289	600	1200	0,09	0,13	5	2	200

CHARACTERISTICS when used as transient suppressor diodes; T_j = 25 °C

clamping voltage at non-repetitive peak reverse current 10/1000 pulse $V_{(CL)R}$ V	I_{RSM} A	reverse current at recommended stand-off voltage I_R μA	V_R V	
max.	max.	max.		BZW03-
11,3	44,2	3000	6,2	C7V5
12,3	40,6	2400	6,8	C8V2
13,3	37,6	100	7,5	C9V1
14,8	34,0	40	8,2	C10
15,7	31,8	30	9,1	C11
17,0	29,4	20	10	C12
18,9	26,4	10	11	C13
20,9	23,9	10	12	C15
22,9	21,8	10	13	C16
25,6	19,5	10	15	C18
28,4	17,6	10	16	C20
31	16,1	10	18	C22
33,8	14,8	10	20	C24
38,1	13,1	10	22	C27
42,2	11,8	10	24	C30
46,2	10,8	10	27	C33
50,1	10,0	10	30	C36
54,1	9,2	10	33	C39
60,7	8,2	10	36	C43
65,5	7,6	10	39	C47
70,8	7,0	10	43	C51
78,6	6,3	10	47	C56
86,5	5,8	10	51	C62
94,4	5,3	10	56	C68
103,5	4,8	10	62	C75
114,0	4,3	10	68	C82
126	3,9	10	75	C91
139	3,6	10	82	C100
152	3,3	10	91	C110
167	3,0	10	100	C120
185	2,7	10	110	C130
204	2,4	10	120	C150
224	2,2	10	130	C160
249	2,0	10	150	C180
276	1,8	10	160	C200
305	1,6	10	180	C220
336	1,5	10	200	C240
380	1,3	10	220	C270

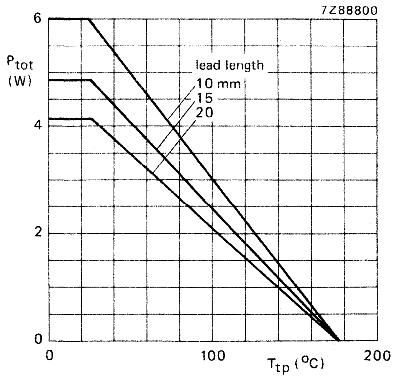


Fig. 4 Maximum total power dissipation as a function of tie-point temperature.

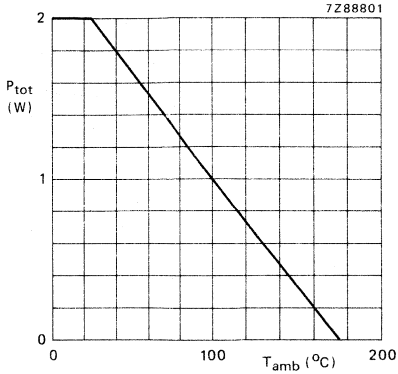


Fig. 5 Maximum total power dissipation as a function of ambient temperature, mounted as shown in Fig. 2.

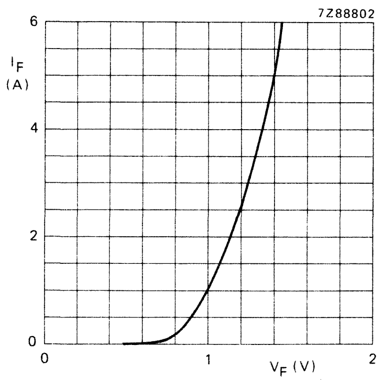


Fig. 6 Typical forward voltage drop at T_j = 25 °C.

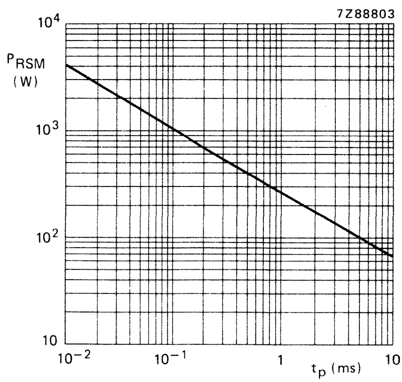


Fig. 7 Maximum non-repetitive peak reverse power dissipation; square current pulse; T_j = 25 °C prior to surge.

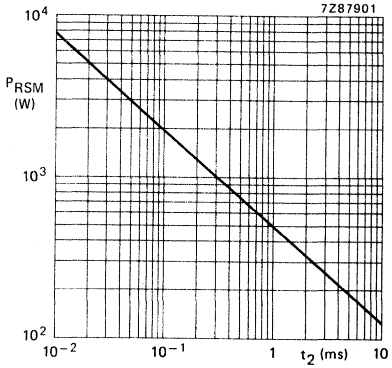


Fig. 8 Maximum non-repetitive peak reverse power dissipation; exponential pulse; T_j = 25 ^oC prior to surge.

TRANSIENT SUPPRESSOR DIODE

A double-diffused silicon glass passivated diode in a hermetically sealed axial-leaded glass envelope intended for transient suppression in telephony equipment.

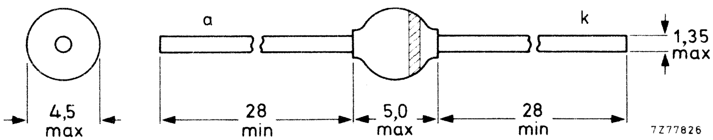
QUICK REFERENCE DATA

Stand-off voltage	V_R	max.	12	V
Non-repetitive peak reverse current	I_{RMS}	max.	50	A
Clamping voltage	$V_{(CL)R}$	<	28	V

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-64.



The marking band indicates the cathode.

RATINGS

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

Stand-off voltage	V_R	max.	12	V
Average forward current	$I_{F(AV)}$	max.	250	mA
Non-repetitive peak reverse current (Fig. 3)	I_{RSM}	max.	50	A
Storage temperature	T_{stg}	−55 to +150		°C
Operating ambient temperature	T_{amb}	−25 to +85		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\ j\text{-}tp}$ = 25 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model") — $R_{th\ j\text{-}a}$ = 75 K/W

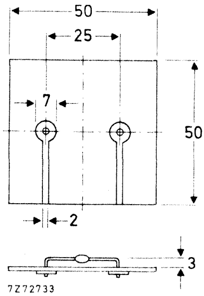


Fig. 2 Dimensions of printed-circuit board.

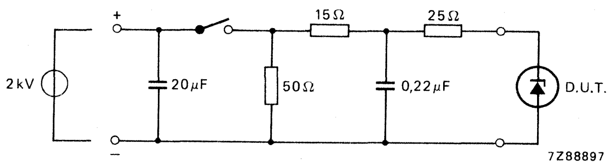


Fig. 3 Test set-up in accordance with FTZ 10/700.

CHARACTERISTICS

T_{amb} = −25 to +85 °C

Forward voltage			
I_F = 1 A	V_F	<	1,3 V
Clamping voltage			
I_{RSM} = 50 A; see Fig. 3			
waveform 6/320 μs exponential pulse (Fig. 4)	$V_{(CL)R}$	<	28 V
Reverse current			
V_R = 12 V	I_R	<	40 μA

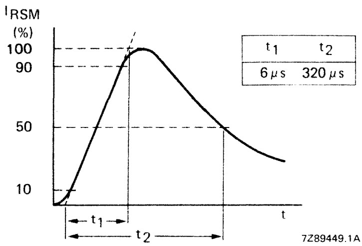


Fig. 4 Peak reverse current as a function of time.

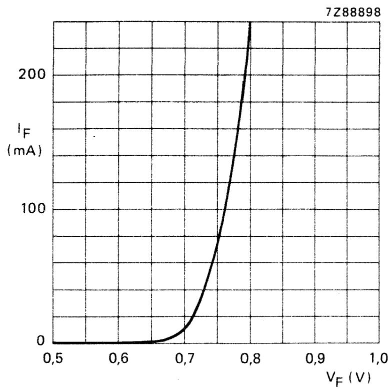


Fig. 5 Typical values forward voltage. T_j = 25 °C.

VOLTAGE REGULATOR DIODES

Silicon planar diodes in a DO-35 envelope intended for use as low-voltage stabilizers or voltage references. 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).

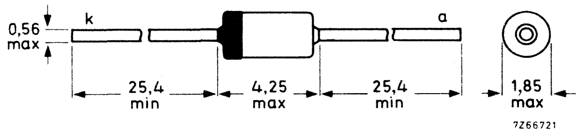
QUICK REFERENCE DATA

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

Fig. 1 DO-35 (SOD-27). Dimensions in mm



Cathode indicated by coloured band

Products, approved to CECC 50 005-005, available on request.

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.	400	mW*
		max.	500	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

$T_j = 25\ ^oC$ unless otherwise specified

Forward voltage

$I_F = 100$ mA — V_F < 1,0 V

Reverse current

Type	Condition			at T_j = 25	150 °C
BZX55-C2V4	$V_R = 1$ V	I_R	<	50	100 μA
C2V7	$V_R = 1$ V	I_R	<	10	50 μA
C3V0	$V_R = 1$ V	I_R	<	4	40 μA
C3V3	$V_R = 1$ V	I_R	<	2	40 μA
C3V6	$V_R = 1$ V	I_R	<	2	40 μA
C3V9	$V_R = 1$ V	I_R	<	2	40 μA
C4V3	$V_R = 1$ V	I_R	<	1	20 μA
C4V7	$V_R = 1$ V	I_R	<	0,5	10 μA
C5V1	$V_R = 1$ V	I_R	<	0,1	2 μA
C5V6	$V_R = 1$ V	I_R	<	0,1	2 μA
C6V2	$V_R = 2$ V	I_R	<	0,1	2 μA
C6V8	$V_R = 3$ V	I_R	<	0,1	2 μA
C7V5	$V_R = 5$ V	I_R	<	0,1	2 μA
C8V2 to C75	$V_R = 0{,}75\ V_{Znom}$	I_R	<	0,1	2 μA

* In still air at maximum lead length up to $T_{amb} = 25\ ^oC$. For the types of 2V4 and 2V7 the power dissipation is limited by $T_j = 175\ ^oC$.

** If leads are kept at $T_{amb} = 50\ ^oC$ at 8 mm from body.

BZX55- . . .	working voltage V_Z (V) at I_Z = 5 mA min.	max.	differential resistance r_{diff} (Ω) at I_Z = 5 mA max.	at I_Z = 1 mA max.	temperature coefficient S_Z (mV/K) at I_Z = 5 mA typ.
C2V4	2,28	2,56	85	600	−1,8
C2V7	2,5	2,9	85	600	−1,9
C3V0	2,8	3,2	85	600	−2,1
C3V3	3,1	3,5	85	600	−2,2
C3V6	3,4	3,8	85	600	−2,4
C3V9	3,7	4,1	85	600	−2,4
C4V3	4,0	4,6	75	600	−2,4
C4V7	4,4	5,0	60	600	−1,4
C5V1	4,8	5,4	35	550	−0,8
C5V6	5,2	6,0	25	450	1,6
C6V2	5,8	6,6	10	200	2,2
C6V8	6,4	7,2	8	150	3,0
C7V5	7,0	7,9	7	50	3,8
C8V2	7,7	8,7	7	50	4,5
C9V1	8,5	9,6	10	50	5,5
C10	9,4	10,6	15	70	6,5
C11	10,4	11,6	20	70	7,7
C12	11,4	12,7	20	90	8,4
C13	12,4	14,1	26	110	9,8
C15	13,8	15,6	30	110	11,3
C16	15,3	17,1	40	170	12,8
C18	16,8	19,1	50	170	14,4
C20	18,8	21,2	55	220	16,0
C22	20,8	23,3	55	220	18,7
C24	22,8	25,6	80	220	20,4
C27	25,1	28,9	80	220	22,9
C30	28,0	32,0	80	220	27,0
C33	31,0	35,0	80	220	29,7
C36	34,0	38,0	80	220	32,4
	at I_Z = 2,5 mA min.	max.	at I_Z = 2,5 mA max.	at I_Z = 0,5 mA max.	at I_Z = 2,5 mA
C39	37,0	41,0	90	500	35,1
C43	40,0	46,0	90	600	38,7
C47	44,0	50,0	110	700	44,0
C51	48,0	54,0	125	700	49,0
C56	52,0	60,0	135	1000	55,0
C62	58,0	66,0	150	1000	62,0
C68	64,0	72,0	200	1000	70,0
C75	70,0	79,0	250	1500	78,0

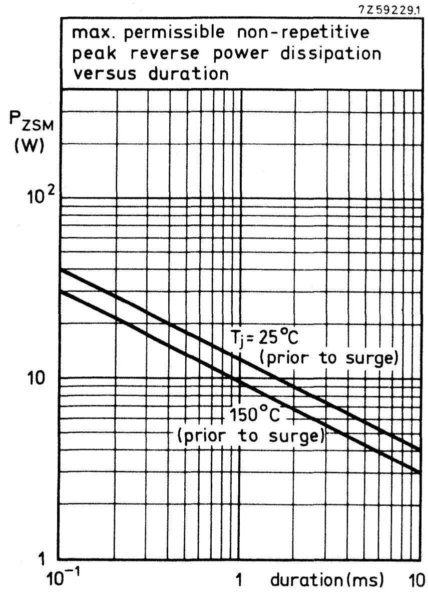


Fig. 2.

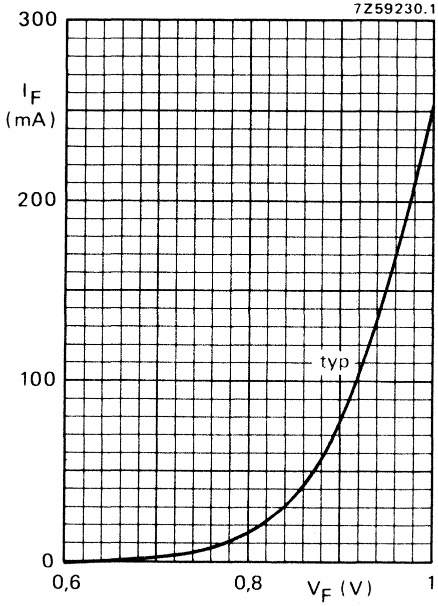


Fig. 3 $T_j = 25\ ^{o}C$.

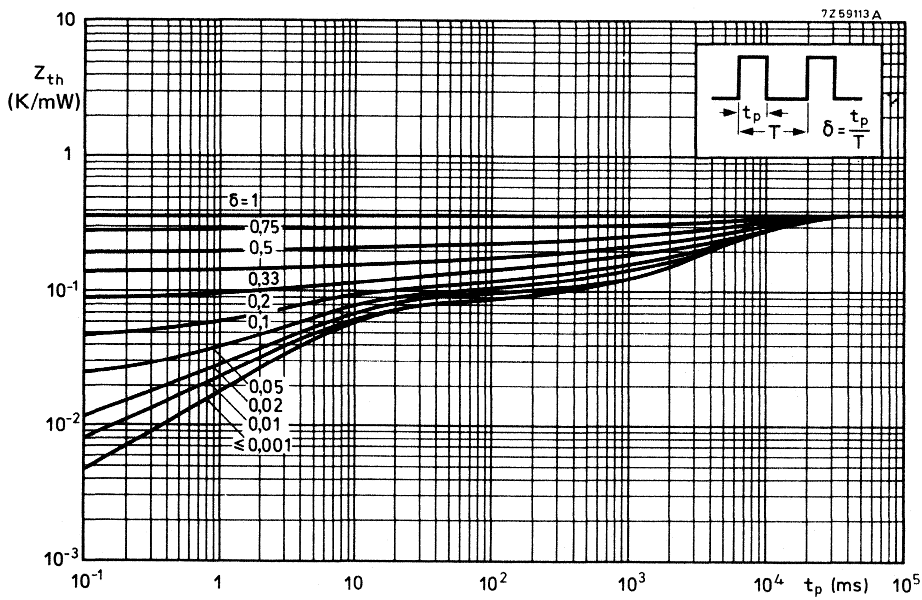


Fig. 4.

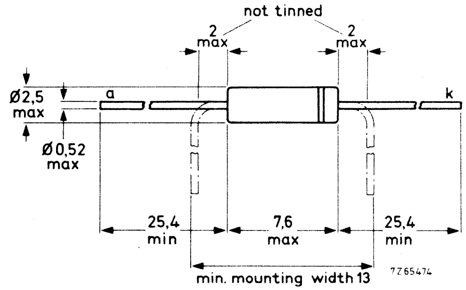
STABISTORS

Diodes with controlled conductance in a all-glass DO-7 envelope intended for low voltage regulation in circuits for clipping, coupling, clamping, meter protection, bias regulation and in many applications which require tight tolerances and low voltage levels.
The series consists of 4 types with nominal voltages ranging from 1,4 to 3,6 V with a tolerance of ±5%.

QUICK REFERENCE DATA				
Regulation voltage range	V_F	nom.	1,4 to 3,6	V
Regulation voltage tolerance			±5	%
Continuous reverse voltage	V_R	max.	10	V
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Repetitive peak forward current	I_{FRM}	max.	250	mA
Total power dissipation up to T_{amb} = 32 °C	P_{tot}	max.	400	mW
Operating junction temperature	T_j	max.	200	°C

MECHANICAL DATA Dimensions in mm

DO-7



Cathode indicated by coloured band

RATINGS Limiting values in accordance with the Absolute Maximum System (IEC134)

Voltages				
Continuous reverse voltage	V_R	max.	10	V
Repetitive peak reverse voltage	V_{RRM}	max.	10	V
Current				
Repetitive peak forward current	I_{FRM}	max.	250	mA
Power dissipation				
Total power dissipation up to T_{amb} = 32 °C	P_{tot}	max.	400	mW
Temperatures				
Storage temperature	T_{stg}	-65 to +175		°C
Operating junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,42	°C/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

	Regulation voltage V_F (V) at I_F = 1 mA			Temperature coefficient S_F (mV/°C) at I_F = 1 mA	Differential resistance r_{diff} (Ω); f = 1 kHz at I_F = 1 mA	
BZX75-....	min.		max.	typ.	typ.	
C1V4	1,16		1,34	-4	60	
C2V1	1,75		2,05	-6	90	
C2V8	2,33		2,70	-8	120	
C3V6	3,02		3,45	-10	150	
	at I_F = 10 mA			at I_F = 10 mA	at I_F = 10 mA	
	min.	nom.	max.	typ.	typ.	max.
C1V4	1,33	1,40	1,47	-3,3	6	10
C2V1	1,99	2,10	2,21	-5,0	9	15
C2V8	2,66	2,80	2,94	-6,6	12	20
C3V6	3,42	3,60	3,78	-8,2	15	25

Reverse current

V_R = 5 V

BZX75-C1V4, BZX75-C2V1: I_R < 500 nA

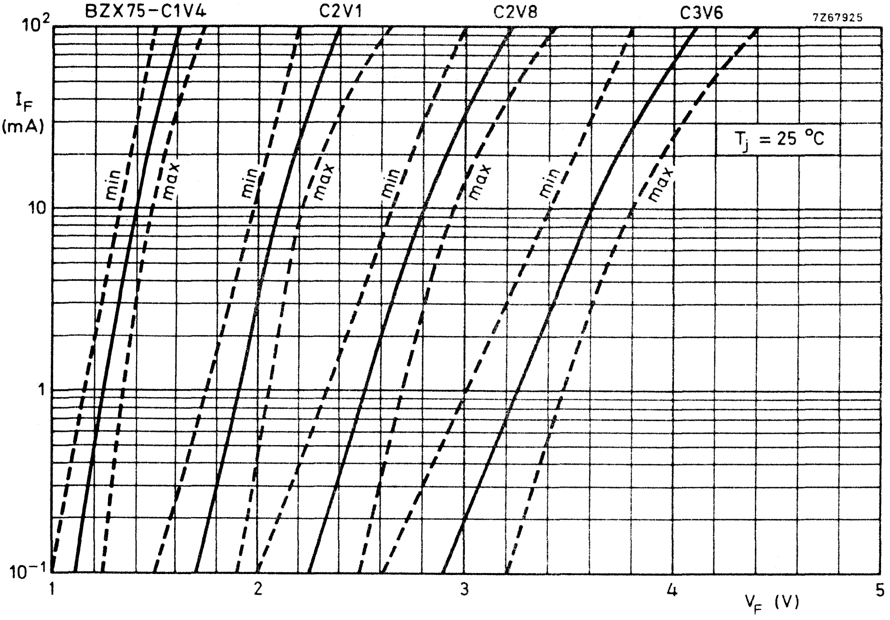
BZX75-C2V8, BZX75-C3V6: I_R < 200 nA

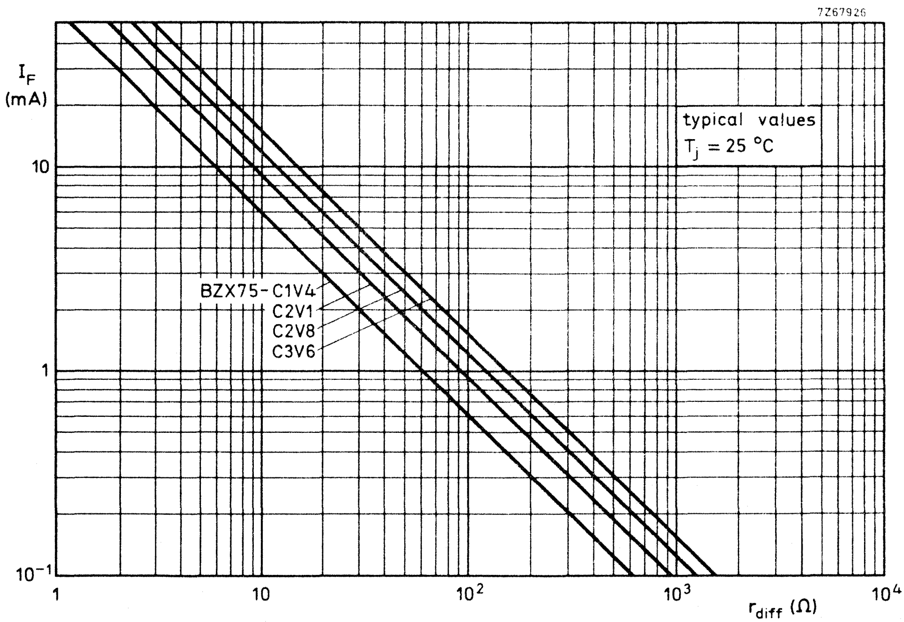
Recovered charge when switched from

I_F = 10 mA to V_R = 5 V; R_L = 500 Ω — Q_s > 600 pC

Diode capacitance

V_R = 0; f = 1 MHz — C_d < 250 pF


BZX75-C1V4
C2V1
C2V8
C3V6
7Z67925
I_F (mA)
10^2
10
1
10^{-1}
min
max
T_j = 25 °C
1
2
3
4
5
V_F (V)


7Z67926
I_F (mA)
10
1
10^{-1}
typical values
T_j = 25 °C
BZX75-C1V4
C2V1
C2V8
C3V6
1
10
10^2
10^3
10^4
r_{diff} (Ω)

VOLTAGE REGULATOR DIODES

Silicon planar diodes in DO-35 envelopes intended for use as low voltage stabilizers or voltage references. They are available in two series; one to the international standardized E24 (± 5%) range and the other with ± 2% tolerance on working voltage. Each series consists of 37 types with nominal working voltages ranging from 2,4 V to 75 V.

QUICK REFERENCE DATA

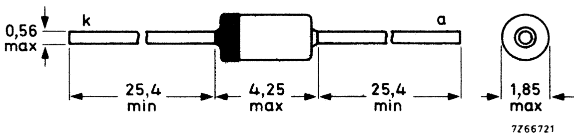
Working voltage range	V_Z	nom.	2,4 to 75	V
Total power dissipation	P_{tot}	max.	500	mW *
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	30	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to tie-point	$R_{th\ j\text{-}tp}$	=	0,30	°C/mW

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

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35.



Cathode indicated by coloured band.

Products approved to CECC 50 005-005, available on request.

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 °C/mW *
From junction to ambient	$R_{th\ j\text{-}a}$	=	0,38 °C/mW **

CHARACTERISTICS

$T_j = 25\ ^oC$

Forward voltage

$I_F = 10$ mA		V_F	<	0,9 V

Reverse current

BZX79-.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
. = C for E24 (± 5%) tolerance

* If leads are kept at $T_{tp} = 50\ ^oC$ at 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 (for ± 2% tolerance range see page 5).

BZX79-...	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/^oC) 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	245	300	←
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	235	300	←
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	225	300	←
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	125	200	←
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	105	200	←
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	95	150	←
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	90	150	←
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	70	150	←
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	

T_j = 25 °C

E24 (± 5%) logarithmic range (for ± 2% tolerance range see page 6).

BZX79-...	working voltage V_Z (V) at I_Z = 1 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA		working voltage V_Z (V) at I_Z = 20 mA			differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	min.	nom.	max.	typ.	max.	min.	nom.	max.	typ.	max.
C2V4	1,7	1,9	2,1	275	600	2,6	2,9	3,2	25	50
C2V7	1,9	2,2	2,4	300	600	3,0	3,3	3,6	25	50
C3V0	2,1	2,4	2,7	325	600	3,3	3,6	3,9	25	50
C3V3	2,3	2,6	2,9	350	600	3,6	3,9	4,2	20	40
C3V6	2,7	3,0	3,3	375	600	3,9	4,2	4,5	20	40
C3V9	2,9	3,2	3,5	400	600	4,1	4,4	4,7	15	30
C4V3	3,3	3,6	4,0	410	600	4,4	4,7	5,1	15	30
C4V7	3,7	4,2	4,7	425	500	4,5	5,0	5,4	8	15
C5V1	4,2	4,7	5,3	400	480	5,0	5,4	5,9	6	15
C5V6	4,8	5,4	6,0	80	400	5,2	5,7	6,3	4	10
C6V2	5,6	6,1	6,6	40	150	5,8	6,3	6,8	3	6
C6V8	6,3	6,7	7,2	30	80	6,4	6,9	7,4	2,5	6
C7V5	6,9	7,4	7,9	30	80	7,0	7,6	8,0	2,5	6
C8V2	7,6	8,1	8,7	40	80	7,7	8,3	8,8	3	6
C9V1	8,4	9,0	9,6	40	100	8,5	9,2	9,7	4	8
C10	9,3	9,9	10,6	50	150	9,4	10,1	10,7	4	10
C11	10,2	10,9	11,6	50	150	10,4	11,1	11,8	5	10
C12	11,2	11,9	12,7	50	150	11,4	12,1	12,9	5	10
C13	12,3	12,9	14,0	50	170	12,5	13,1	14,2	5	15
C15	13,7	14,9	15,5	50	200	13,9	15,1	15,7	6	20
C16	15,2	15,9	17,0	50	200	15,4	16,1	17,2	6	20
C18	16,7	17,9	19,0	50	225	16,9	18,1	19,2	6	20
C20	18,7	19,9	21,1	60	225	18,9	20,1	21,4	7	20
C22	20,7	21,9	23,2	60	250	20,9	22,1	23,4	7	25
C24	22,7	23,9	25,5	60	250	22,9	24,1	25,7	7	25
	at I_Z = 0,1 mA			at I_Z = 0,5 mA		at I_Z = 10 mA			at I_Z = 10 mA	
C27	25,0	26,9	28,9	65	300	25,2	27,1	29,3	10	45
C30	27,8	29,9	32,0	70	300	28,1	30,1	32,4	15	50
C33	30,8	32,9	35,0	75	325	31,1	33,1	35,4	20	55
C36	33,8	35,9	38,0	80	350	34,1	36,1	38,4	25	60
C39	36,7	38,9	41,0	80	350	37,1	39,1	41,5	25	70
C43	39,7	42,9	46,0	85	375	40,1	43,1	46,5	25	80
C47	43,7	46,8	50,0	85	375	44,1	47,1	50,5	30	90
C51	47,6	50,8	54,0	90	400	48,1	51,1	54,6	35	100
C56	51,5	55,7	60,0	100	425	52,1	56,1	60,8	45	110
C62	57,4	61,7	66,0	120	450	58,2	62,1	67,0	60	120
C68	63,4	67,7	72,0	150	475	64,2	68,2	73,2	75	130
C75	69,4	74,7	79,0	170	500	70,3	75,3	80,2	90	140

T_j = 25 °C
± 2% tolerance range.

BZX79-...	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/°C) 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.
B2V4	2,35	2,45	70	100	−2,6	−1,6	−0,6	375	450
B2V7	2,65	2,75	75	100	−3,0	−2,0	−1,0	350	450
B3V0	2,94	3,06	80	95	−3,0	−2,1	−1,2	350	450
B3V3	3,23	3,37	85	95	−3,2	−2,4	−1,5	325	450
B3V6	3,53	3,67	85	90	−3,2	−2,4	−1,5	300	450
B3V9	3,82	3,98	85	90	−3,2	−2,5	−1,5	300	450
B4V3	4,21	4,39	80	90	−3,2	−2,5	−1,2	275	450
B4V7	4,61	4,79	50	80	−2,0	−1,4	−0,8	125	180
B5V1	5,00	5,20	40	60	−1,6	−0,8	0,5	125	180
B5V6	5,49	5,71	15	40	−0,7	1,2	2,2	125	180
B6V2	6,08	6,32	6	10	1,0	2,3	3,2	90	130
B6V8	6,66	6,94	6	15	2,0	3,0	4,0	85	110
B7V5	7,35	7,65	6	15	3,0	4,0	4,8	80	100
B8V2	8,04	8,36	6	15	3,6	4,6	5,5	75	95
B9V1	8,92	9,28	6	15	4,3	5,5	6,5	70	90
B10	9,80	10,20	8	20	5,2	6,4	7,4	70	90
B11	10,80	11,20	10	20	6,2	7,4	8,5	65	85
B12	11,80	12,20	10	25	7,0	8,4	9,5	65	85
B13	12,70	13,30	10	30	7,8	9,4	10,5	60	80
B15	14,70	15,30	10	30	10,0	11,4	12,4	55	75
B16	15,70	16,30	10	40	10,9	12,4	13,5	52	75
B18	17,60	18,40	10	45	12,8	14,4	15,6	47	70
B20	19,60	20,40	15	55	14,8	16,4	17,6	36	60
B22	21,60	22,40	20	55	16,8	18,4	19,6	34	60
B24	23,50	24,50	25	70	18,7	20,4	21,6	33	55
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA				
B27	26,50	27,50	25	80	21,4	23,4	25,3	30	50
B30	29,40	30,60	30	80	24,4	26,6	29,0	27	50
B33	32,30	33,70	35	80	27,4	29,7	32,5	25	45
B36	35,30	36,70	35	90	30,4	33,0	36,0	23	45
B39	38,20	39,80	40	130	33,4	36,4	40,0	21	45
B43	42,10	43,90	45	150	38,0	41,2	45,0	21	40
B47	46,10	47,90	50	170	42,5	46,1	50,0	19	40
B51	50,00	52,00	60	180	47,0	51,0	55,0	19	40
B56	54,90	57,10	70	200	52,5	57,0	62,0	18	40
B62	60,80	63,20	80	215	59,0	64,4	69,0	17	35
B68	66,60	69,40	90	240	66,0	71,7	77,0	17	35
B75	73,50	76,50	95	255	74,0	80,2	86,0	16,5	35

T_j = 25 °C
± 2% tolerance range.

BZX79-...	working voltage V_Z (V) at I_Z = 1 mA nom.	differential resistance r_{diff} (Ω) at I_Z = 1 mA typ.	max.	working voltage V_Z (V) at I_Z = 20 mA nom.	differential resistance r_{diff} (Ω) at I_Z = 20 mA typ.	max.
B2V4	1,9	275	600	2,9	25	50
B2V7	2,2	300	600	3,3	25	50
B3V0	2,4	325	600	3,6	25	50
B3V3	2,6	350	600	3,9	20	40
B3V6	3,0	375	600	4,2	20	40
B3V9	3,2	400	600	4,4	15	30
B4V3	3,6	410	600	4,7	15	30
B4V7	4,2	425	500	5,0	8	15
B5V1	4,7	400	480	5,4	6	15
B5V6	5,4	80	400	5,7	4	10
B6V2	6,1	40	150	6,3	3	6
B6V8	6,7	30	80	6,9	2,5	6
B7V5	7,4	30	80	7,6	2,5	6
B8V2	8,1	40	80	8,3	3	6
B9V1	9,0	40	100	9,2	4	8
B10	9,9	50	150	10,1	4	10
B11	10,9	50	150	11,1	5	10
B12	11,9	50	150	12,1	5	10
B13	12,9	50	170	13,1	5	15
B15	14,9	50	200	15,1	6	20
B16	15,9	50	200	16,1	6	20
B18	17,9	50	225	18,1	6	20
B20	19,9	60	225	20,1	7	20
B22	21,9	60	250	22,1	7	25
B24	23,9	60	250	24,1	7	25
	at I_Z = 0,1 mA	at I_Z = 0,5 mA		at I_Z = 10 mA	at I_Z = 10 mA	
B27	26,9	65	300	27,1	10	45
B30	29,9	70	300	30,1	15	50
B33	32,9	75	325	33,1	20	55
B36	35,9	80	350	36,1	25	60
B39	38,9	80	350	39,1	25	70
B43	42,9	85	375	43,1	25	80
B47	46,8	85	375	47,1	30	90
B51	50,8	90	400	51,1	35	100
B56	55,7	100	425	56,1	45	110
B62	61,7	120	450	62,1	60	120
B68	67,7	150	475	68,2	75	130
B75	74,7	170	500	75,3	90	140

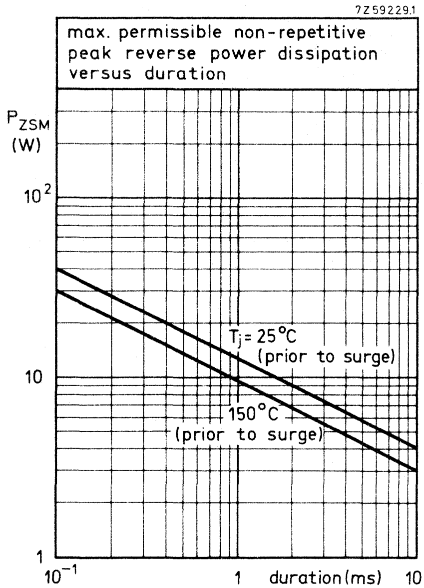

7Z59229.1
max. permissible non-repetitive
peak reverse power dissipation
versus duration
P_{ZSM}
(W)
10^2
10
1
10^{-1}
1
duration (ms)
10
T_j = 25 °C
(prior to surge)
150 °C
(prior to surge)

Fig. 2.

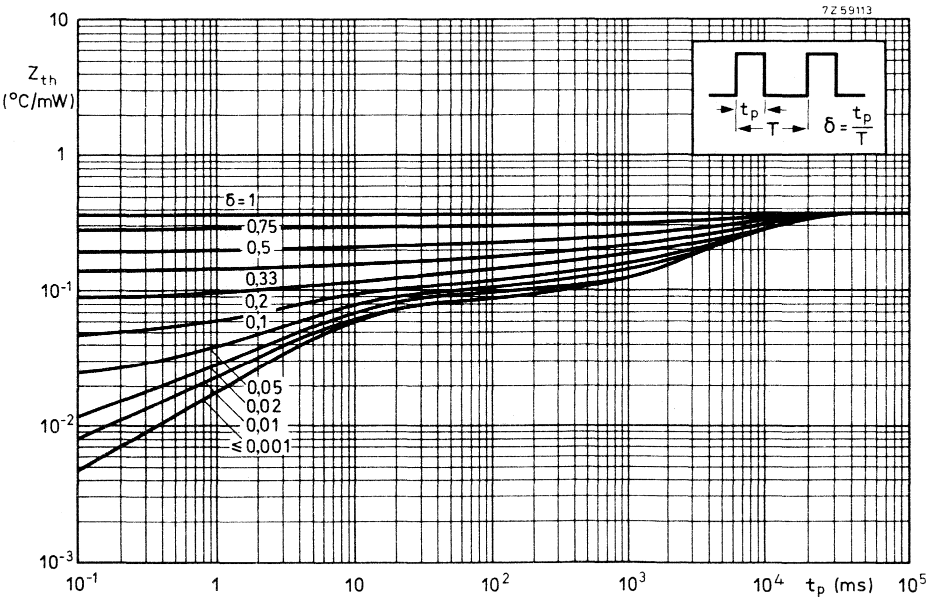

7Z59113
10
Z_{th}
(°C/mW)
1
10^{-1}
10^{-2}
10^{-3}
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5
δ = 1
0,75
0,5
0,33
0,2
0,1
0,05
0,02
0,01
≤ 0,001
t_p
T
$\delta = \frac{t_p}{T}$

Fig. 3.

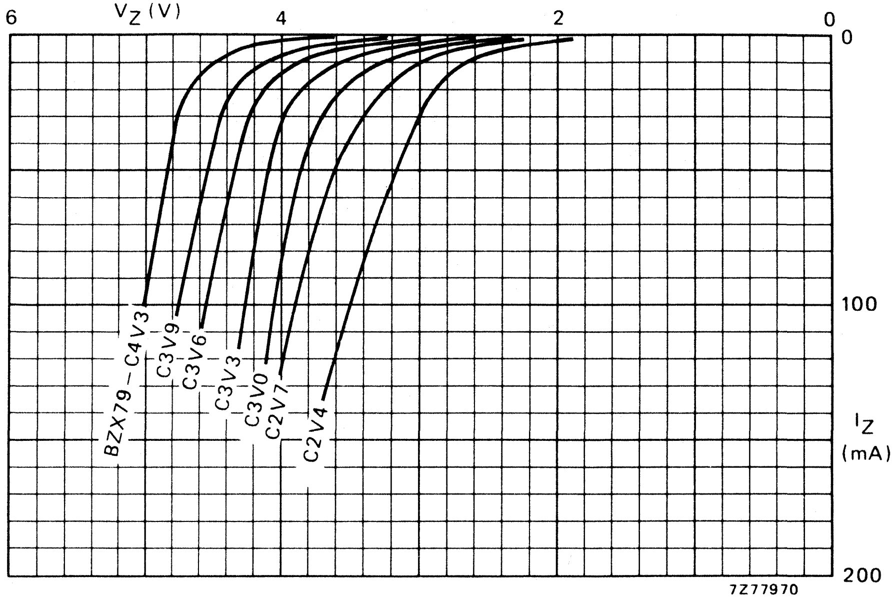


Fig. 4 Static characteristics; typical values; T_{amb} = 25 °C.

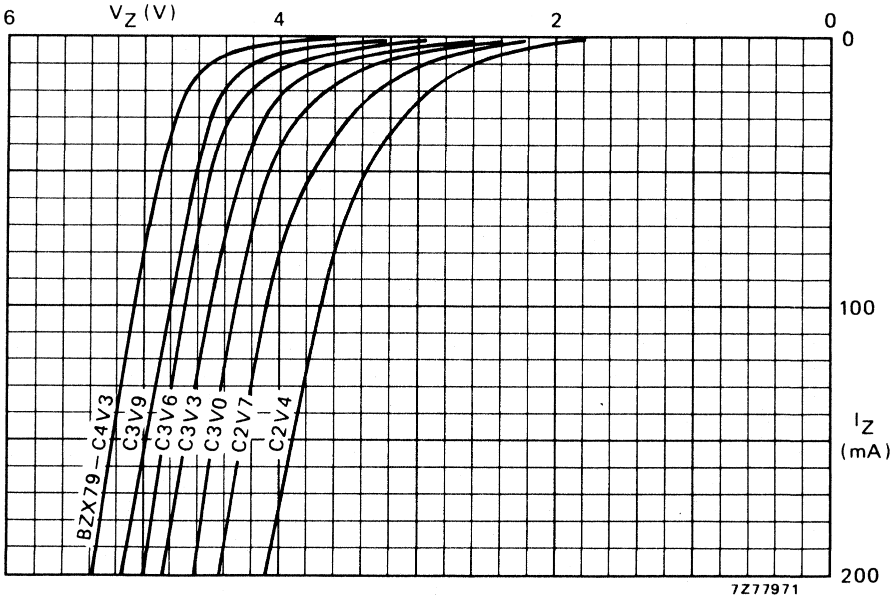


Fig. 5 Dynamic characteristics; typical values; T_j = 25 °C.

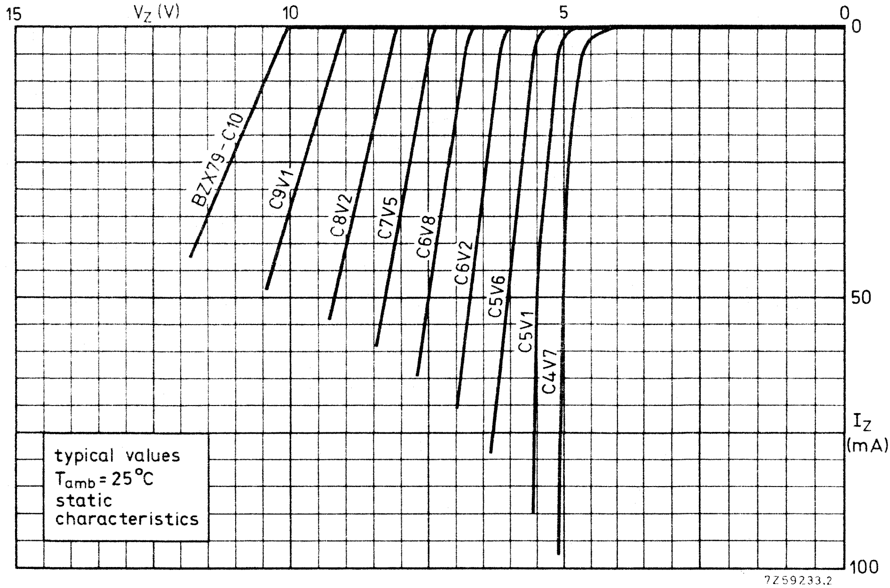

15
V_Z (V)
10
5
0
0
50
100
I_Z (mA)
BZX79-C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_{amb} = 25 °C
static
characteristics
7Z59233.2

Fig. 6.

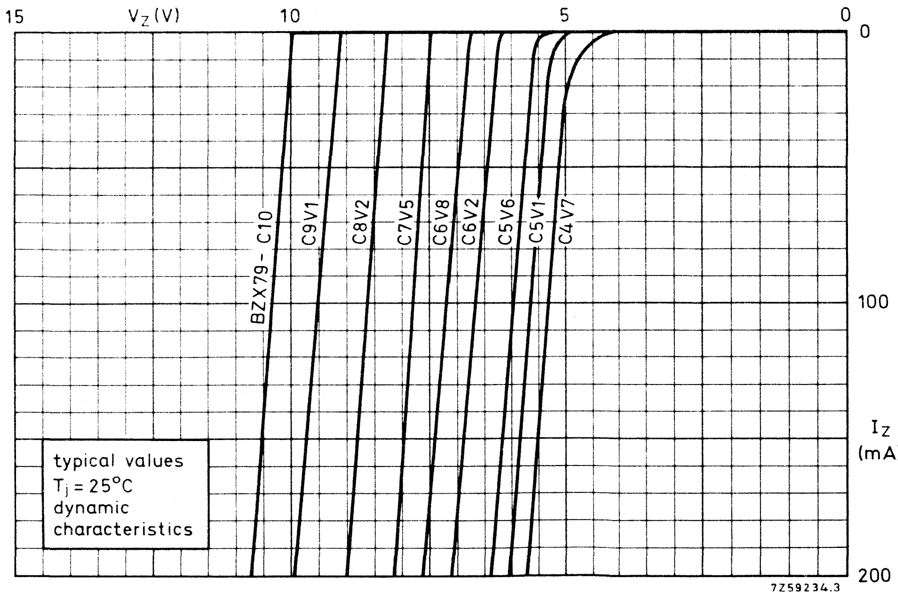

15
V_Z (V)
10
5
0
0
100
200
I_Z (mA)
BZX79- C10
C9V1
C8V2
C7V5
C6V8
C6V2
C5V6
C5V1
C4V7
typical values
T_j = 25 °C
dynamic
characteristics
7Z59234.3

Fig. 7.

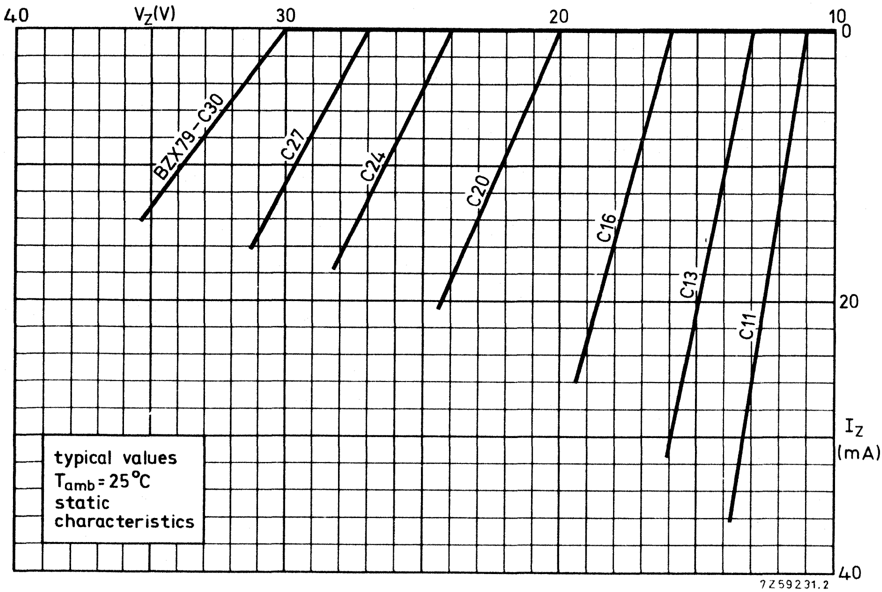

40
V_Z(V)
30
20
10
0
BZX79-C30
C27
C24
C20
C16
C13
C11
20
I_Z
(mA)
40
typical values
T_{amb} = 25 °C
static
characteristics
7Z59231.2

Fig. 8.

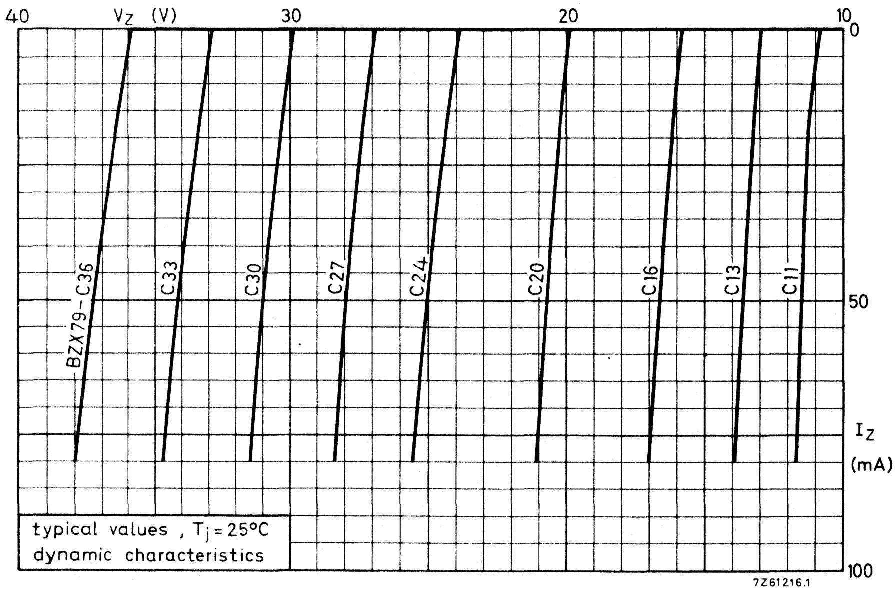

40
V_Z (V)
30
20
10
0
BZX79-C36
C33
C30
C27
C24
C20
C16
C13
C11
50
I_Z
(mA)
100
typical values , T_j = 25°C
dynamic characteristics
7Z61216.1

Fig. 9.

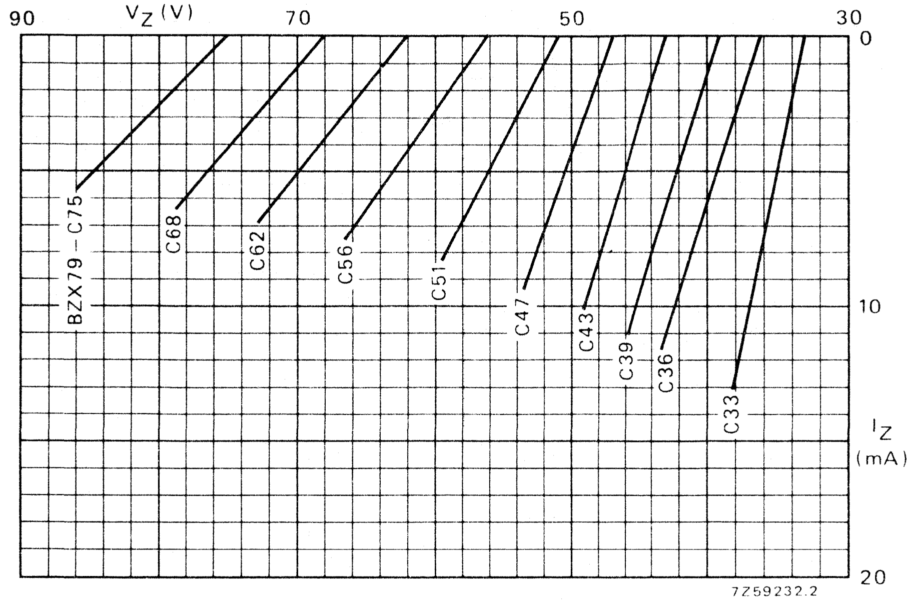


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

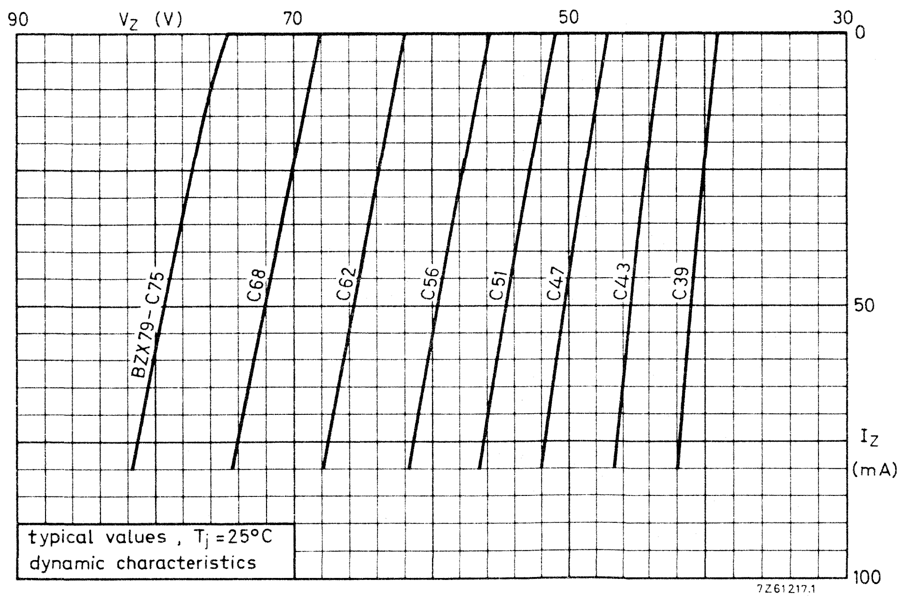


Fig. 11.

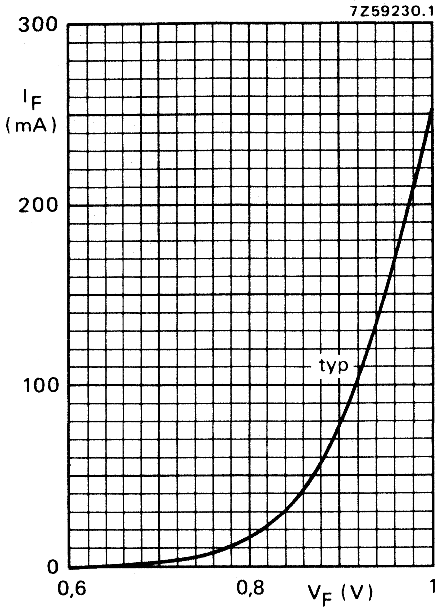


Fig. 12 T_j = 25 °C.

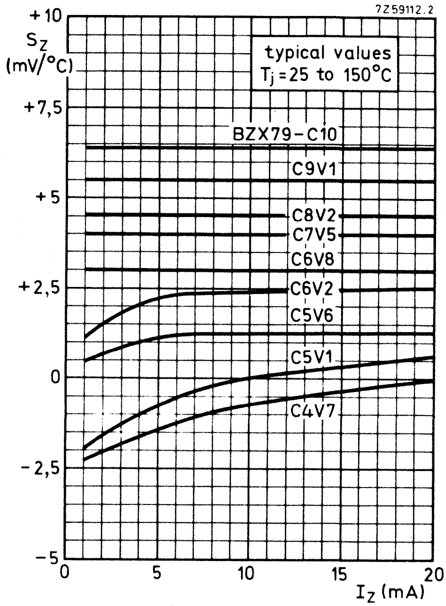


Fig. 13.

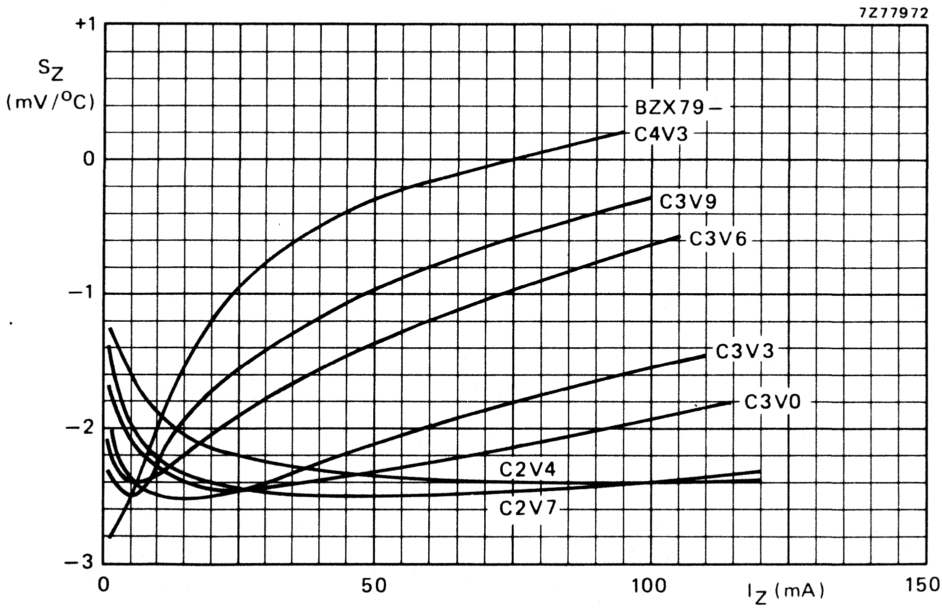


Fig. 14 Typical values; T_j = 25 to 150 °C.

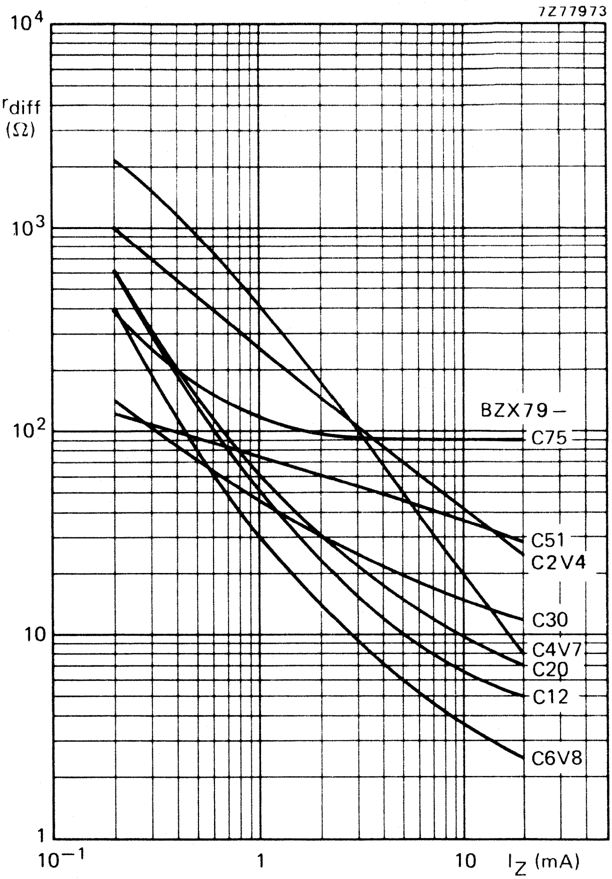


Fig. 15 Typical values; T_j = 25 °C; f = 1 kHz.

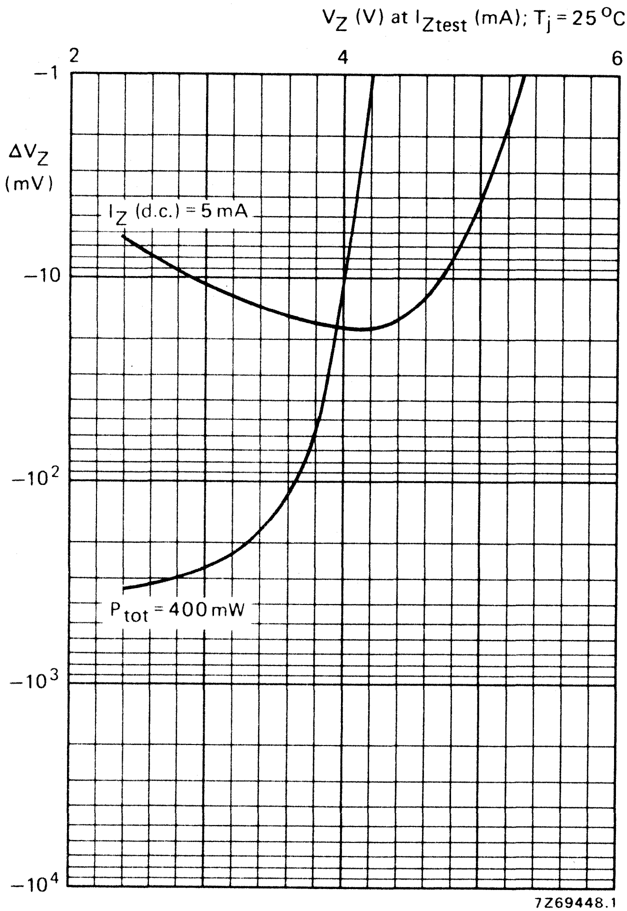


Fig. 16 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

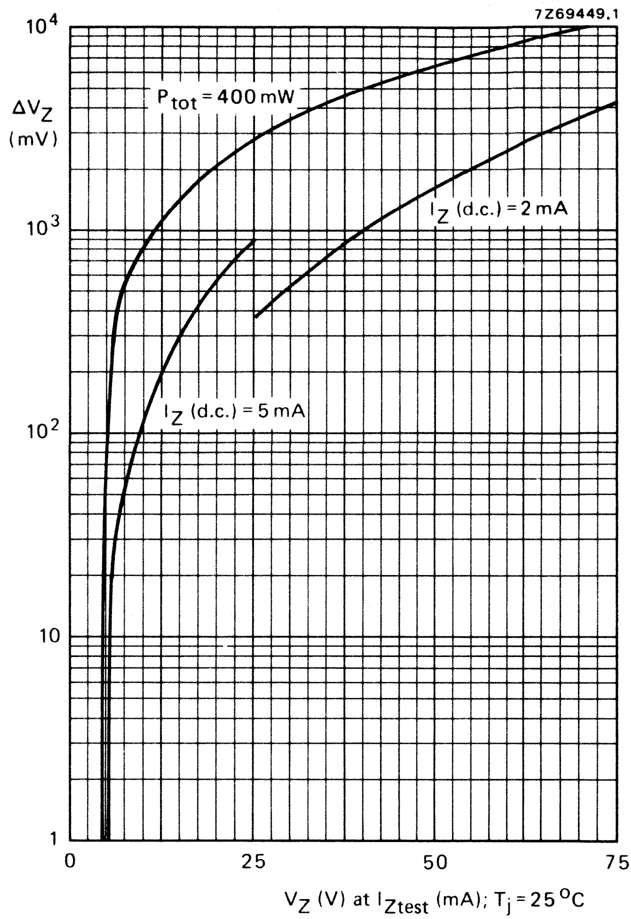


Fig. 17 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

SILICON PLANAR VOLTAGE REGULATOR DIODES

Low power general purpose voltage regulator diodes in a microminiature plastic envelope intended for application 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 working voltage tolerance of ± 5%.

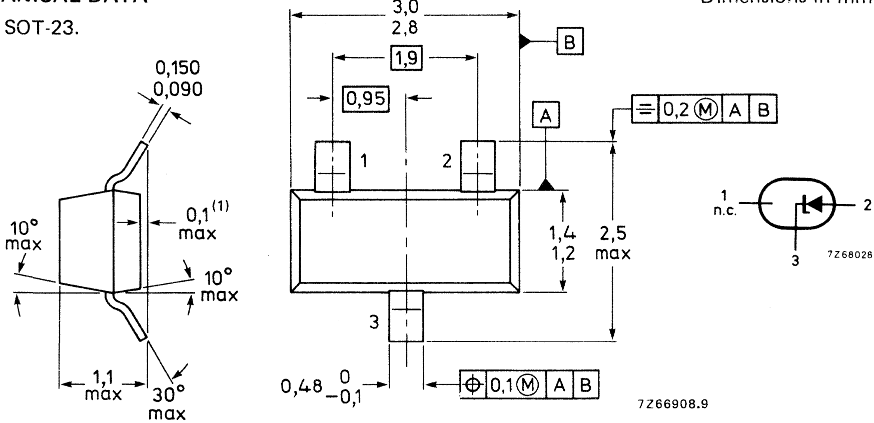
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	2,4 to 75	V
Working voltage tolerance			± 5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	350	mW
Junction temperature	T_j	max.	175	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-23.



(1) Also available in 0,1 – 0,2 mm version.

TOP VIEW

See also *Soldering recommendations.*

Marking code

BZX84-C2V4 = Z11	BZX84-C5V6 = Z3	BZX84-C13 = Y3	BZX84-C33 = Y12
C2V7 = Z12	C6V2 = Z4	C15 = Y4	C36 = Y13
C3V0 = Z13	C6V8 = Z5	C16 = Y5	C39 = Y14
C3V3 = Z14	C7V5 = Z6	C18 = Y6	C43 = Y15
C3V6 = Z15	C8V2 = Z7	C20 = Y7	C47 = Y16
C3V9 = Z16	C9V1 = Z8	C22 = Y8	C51 = Y17
C4V3 = Z17	C10 = Z9	C24 = Y9	C56 = Y18
C4V7 = Z1	C11 = Y1	C27 = Y10	C62 = Y19
C5V1 = Z2	C12 = Y2	C30 = Y11	C68 = Y20
			C75 = Y21

RATINGS

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

Repetitive peak forward current	I_{FRM}	max.	250 mA
Repetitive peak working current	I_{ZRM}	max.	250 mA
Total power dissipation up to T_{amb} = 25 °C**	P_{tot}	max.	350 mW
Storage temperature	T_{stg}	−65 to + 175 °C	
Junction temperature	T_j	max.	175 °C

THERMAL CHARACTERISTICS*

$T_j = P \times (R_{th\ j\text{-}t} + R_{th\ t\text{-}s} + R_{th\ s\text{-}a}) + T_{amb}$

Thermal resistance

From junction to tab	$R_{th\ j\text{-}t}$	=	50 K/W
From tab to soldering points	$R_{th\ t\text{-}s}$	=	280 K/W
From soldering points to ambient**	$R_{th\ s\text{-}a}$	=	90 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 10 mA		V_F	<	0,9 V

Reverse current

BZX84-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	V_R = 8 V	I_R	<	100 nA
C12	V_R = 8 V	I_R	<	100 nA
C13	V_R = 8 V	I_R	<	100 nA
C15 to C75	V_R = 0,7 V_{Znom}	I_R	<	50 nA

* See *Thermal characteristics.*

** Device mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

BZX84-....	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/°C) 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	245	300 ←
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	235	300 ←
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	225	300 ←
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	125	200 ←
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	105	200 ←
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	95	150 ←
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	90	150 ←
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	70	150 ←
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_Z = 2 mA		at I_Z = 2 mA		at I_Z = 2 mA				
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
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

BZX84-....	working voltage V_Z (V) at I_Z = 1 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA		working voltage V_Z (V) at I_Z = 20 mA			differential resistance r_{diff} (Ω) at I_Z = 20 mA	
	min.	nom.	max.	typ.	max.	min.	nom.	max.	typ.	max.
C2V4	1,7	1,9	2,1	275	600	2,6	2,9	3,2	25	50
C2V7	1,9	2,2	2,4	300	600	3,0	3,3	3,6	25	50
C3V0	2,1	2,4	2,7	325	600	3,3	3,6	3,9	25	50
C3V3	2,3	2,6	2,9	350	600	3,6	3,9	4,2	20	40
C3V6	2,7	3,0	3,3	375	600	3,9	4,2	4,5	20	40
C3V9	2,9	3,2	3,5	400	600	4,1	4,4	4,7	15	30
C4V3	3,3	3,6	4,0	410	600	4,4	4,7	5,1	15	30
C4V7	3,7	4,2	4,7	425	500	4,5	5,0	5,4	8	15
C5V1	4,2	4,7	5,3	400	480	5,0	5,4	5,9	6	15
C5V6	4,8	5,4	6,0	80	400	5,2	5,7	6,3	4	10
C6V2	5,6	6,1	6,6	40	150	5,8	6,3	6,8	3	6
C6V8	6,3	6,7	7,2	30	80	6,4	6,9	7,4	2,5	6
C7V5	6,9	7,4	7,9	30	80	7,0	7,6	8,0	2,5	6
C8V2	7,6	8,1	8,7	40	80	7,7	8,3	8,8	3	6
C9V1	8,4	9,0	9,6	40	100	8,5	9,2	9,7	4	8
C10	9,3	9,9	10,6	50	150	9,4	10,1	10,7	4	10
C11	10,2	10,9	11,6	50	150	10,4	11,1	11,8	5	10
C12	11,2	11,9	12,7	50	150	11,4	12,1	12,9	5	10
C13	12,3	12,9	14,0	50	170	12,5	13,1	14,2	5	15
C15	13,7	14,9	15,5	50	200	13,9	15,1	15,7	6	20
C16	15,2	15,9	17,0	50	200	15,4	16,1	17,2	6	20
C18	16,7	17,9	19,0	50	225	16,9	18,1	19,2	6	20
C20	18,7	19,9	21,1	60	225	18,9	20,1	21,4	7	20
C22	20,7	21,9	23,2	60	250	20,9	22,1	23,4	7	25
C24	22,7	23,9	25,5	60	250	22,9	24,1	25,7	7	25
	at I_Z = 0,1 mA			at I_Z = 0,5 mA		at I_Z = 10 mA			at I_Z = 10 mA	
	min.	nom.	max.	typ.	max.	min.	nom.	max.	typ.	max.
C27	25,0	26,9	28,9	65	300	25,2	27,1	29,3	10	45
C30	27,8	29,9	32,0	70	300	28,1	30,1	32,4	15	50
C33	30,8	32,9	35,0	75	325	31,1	33,1	35,4	20	55
C36	33,8	35,9	38,0	80	350	34,1	36,1	38,4	25	60
C39	36,7	38,9	41,0	80	350	37,1	39,1	41,5	25	70
C43	39,7	42,9	46,0	85	375	40,1	43,1	46,5	25	80
C47	43,7	46,8	50,0	85	375	44,1	47,1	50,5	30	90
C51	47,6	50,8	54,0	90	400	48,1	51,1	54,6	35	100
C56	51,5	55,7	60,0	100	425	52,1	56,1	60,8	45	110
C62	57,4	61,7	66,0	120	450	58,2	62,1	67,0	60	120
C68	63,4	67,7	72,0	150	475	64,2	68,2	73,2	75	130
C75	69,4	74,7	79,0	170	500	70,3	75,3	80,2	90	140

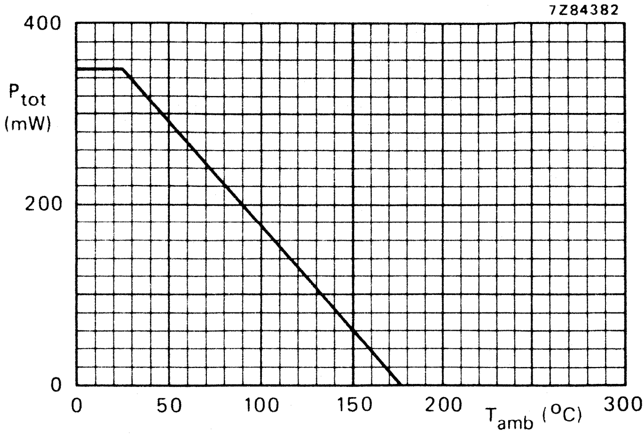


Fig. 2 Power derating curve.

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 in Figs 3 to 6.
$\Delta V_Z = \Delta T \times S_Z$. 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

BZX84-C24 mounted on a ceramic substrate of 7 x 5 x 0,6 mm; at I_Z = 7 mA.

$$V_{Z\ stat} = 24 + \left(\frac{7}{1000} \times 24 \times \frac{430}{1000} \times 20{,}3\right)$$

$$= 24 + 1{,}47 = 25{,}47\ \text{V}.$$

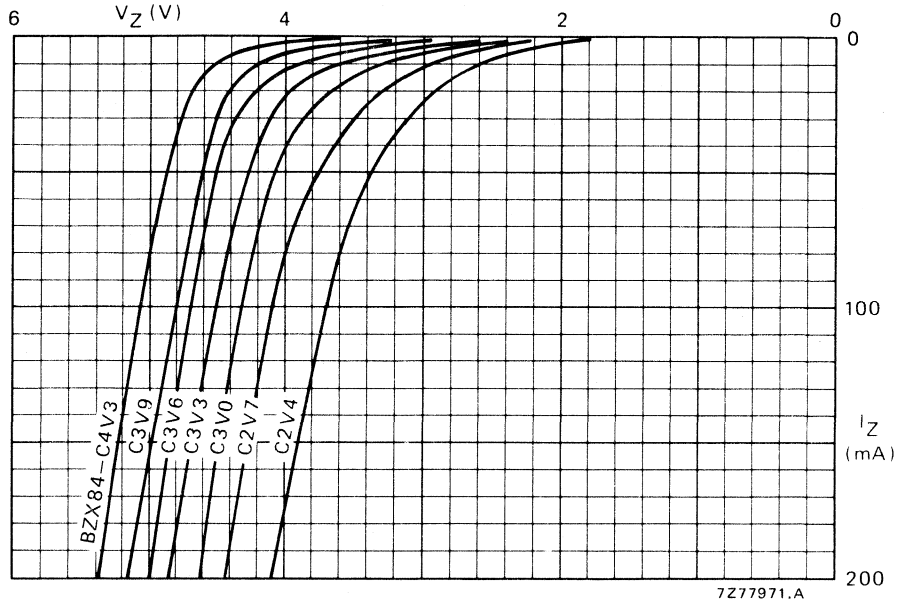


Fig. 3 Dynamic characteristics; typical values; T_j = 25 °C.

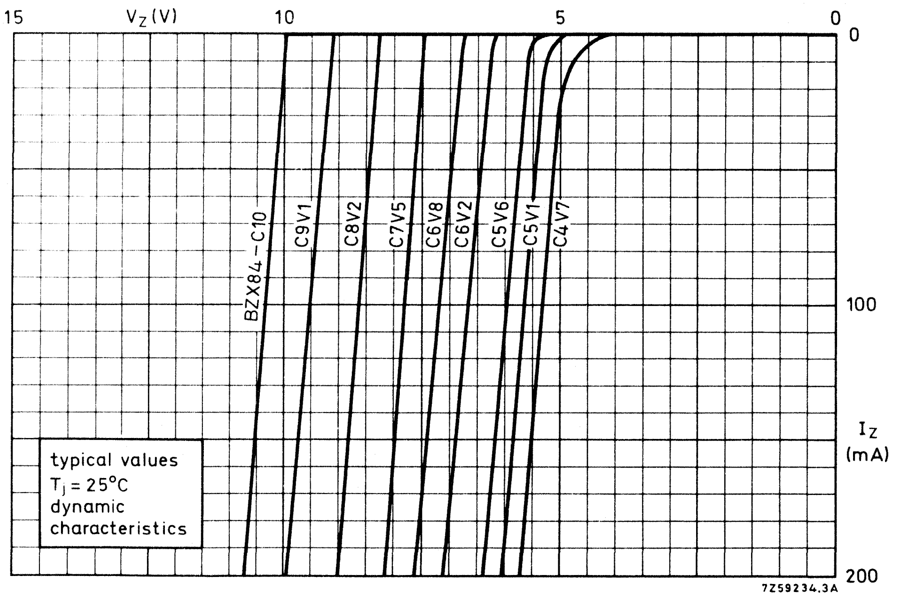


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

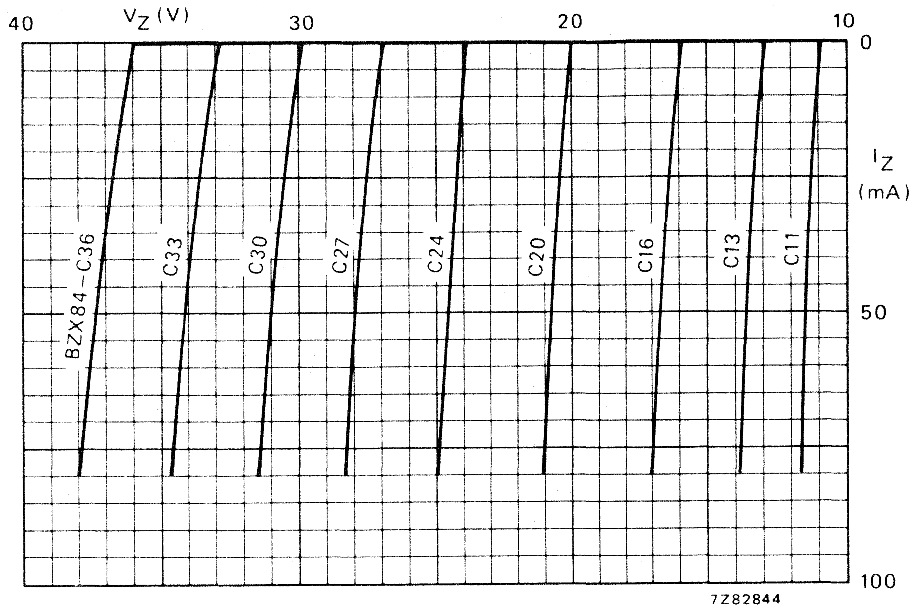


Fig. 5 Dynamic characteristics; typical values; T_j = 25 °C.

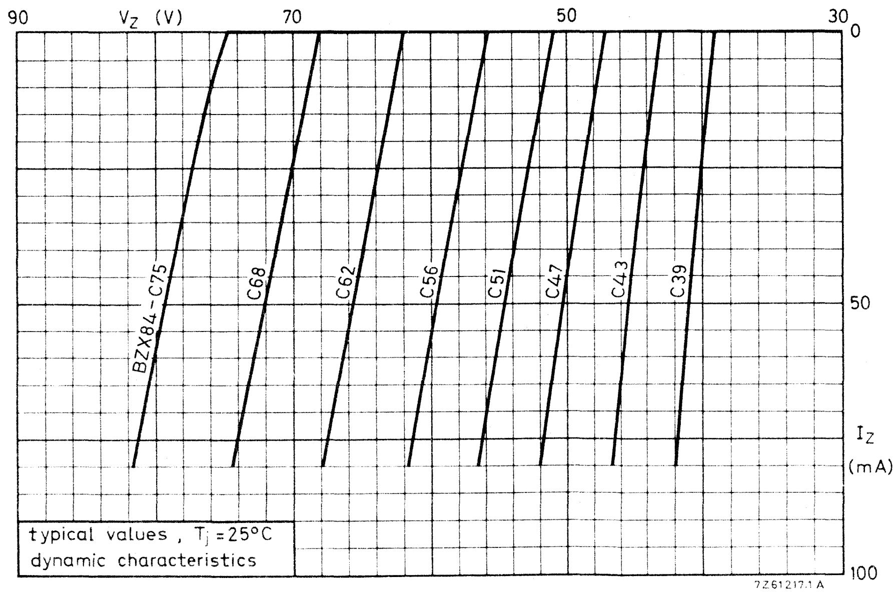


Fig. 6 Dynamic characteristics; typical values; T_j = 25 °C.

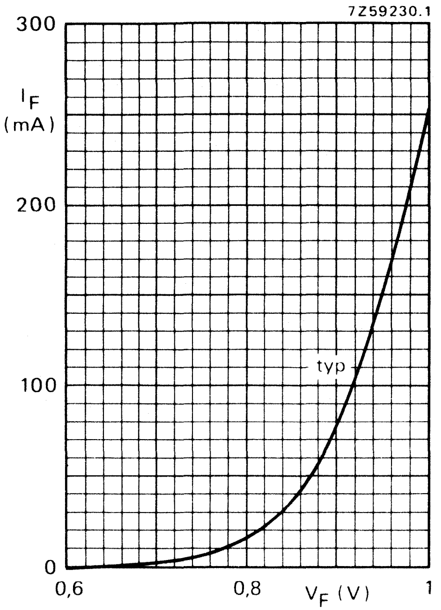


Fig. 7 Typical values at T_j = 25 °C.

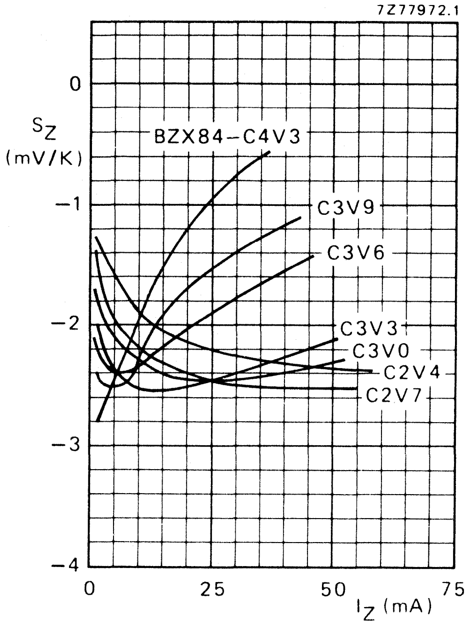


Fig. 8 Typical values; T_j = 25 to 175 °C.

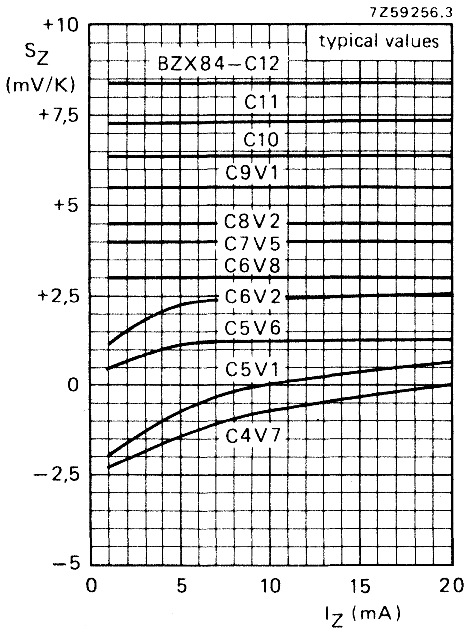


Fig. 9 Typical values; T_j = 25 to 175 °C.

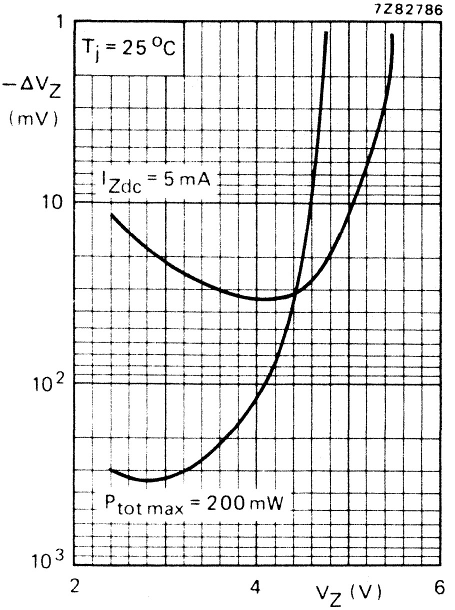


Fig. 10.

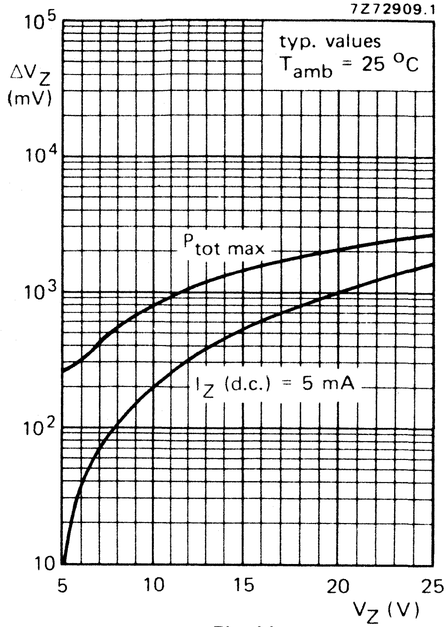


Fig. 11.

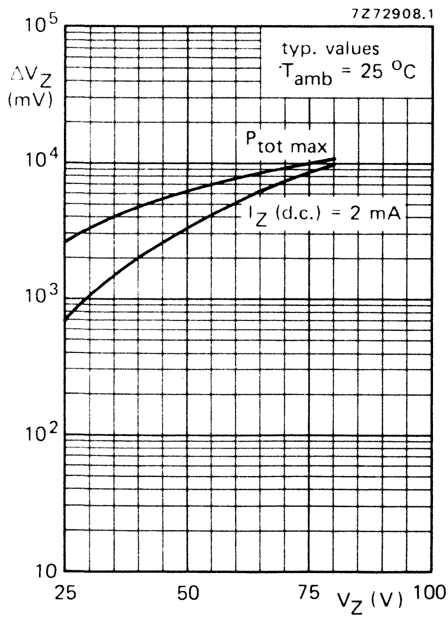


Fig. 12.

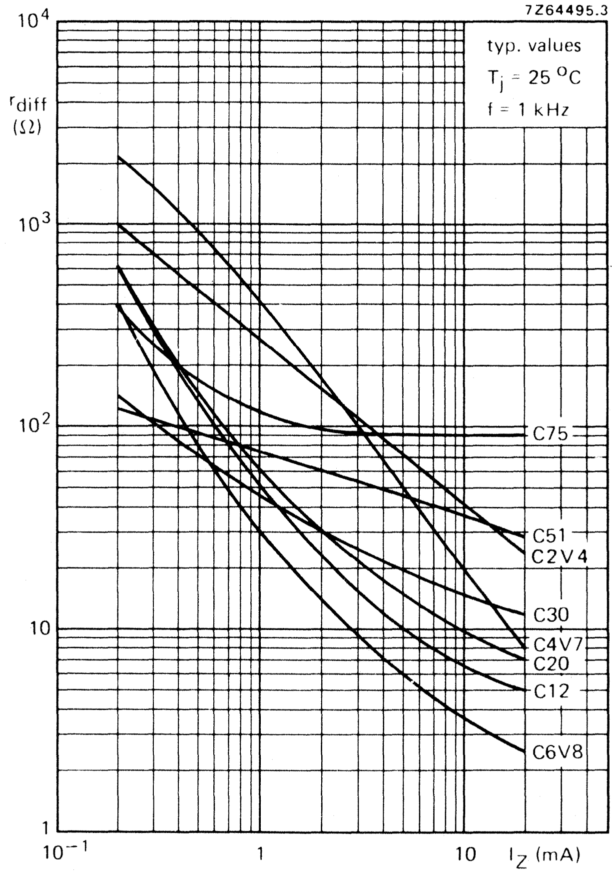

7Z64495.3
typ. values
T_j = 25 °C
f = 1 kHz
r_{diff} (Ω)
10^4
10^3
10^2
10
1
10^{-1}
1
10
I_Z (mA)
C75
C51
C2V4
C30
C4V7
C20
C12
C6V8

Fig. 13.

VOLTAGE REFERENCE DIODES

Voltage reference diodes in a whiskerless glass envelope. They have a very low temperature coefficient and are primarily intended for use as reference sources.

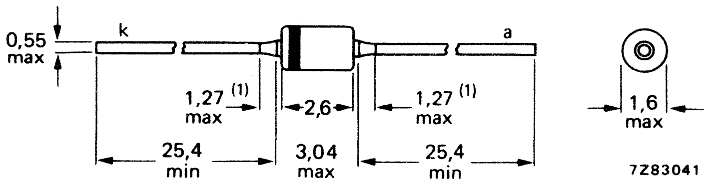
QUICK REFERENCE DATA

			min.	typ.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}	6,2	6,5	6,8	V
Temperature coefficient at I_Z = 7,5 mA *	BZX90:	$\|S_Z\|$	<	0,01		%/°C
	BZX91:	$\|S_Z\|$	<	0,005		%/°C
	BZX92:	$\|S_Z\|$	<	0,002		%/°C
	BZX93:	$\|S_Z\|$	<	0,001		%/°C
	BZX94:	$\|S_Z\|$	<	0,0005		%/°C
Operating ambient temperature		T_{amb}	−55 to + 100			°C

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by coloured band.

* For accuracy of I_Z see Figs. 8 and 9.

RATINGS

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

Working current (d.c.)	I_Z	max.	50	mA
Working current (peak value)	I_{ZM}	max.	50	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Storage temperature	T_{stg}	−65 to	+ 200	°C
Operating ambient temperature	T_{amb}	−55 to	+ 100	°C

THERMAL RESISTANCE

→ From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,4	K/mW

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

			min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}	6,2	6,5	6,8	V

Reference voltage excursion at I_Z = 7,5 mA * T_{amb} = −55 to + 100 °C	BZX90:	$\|\Delta V_{ref}\|$	<	100	mV
	BZX91:	$\|\Delta V_{ref}\|$	<	50	mV
	BZX92:	$\|\Delta V_{ref}\|$	<	20	mV
	BZX93:	$\|\Delta V_{ref}\|$	<	10	mV
	BZX94:	$\|\Delta V_{ref}\|$	<	5	mV
Temperature coefficient at I_Z = 7,5 mA * T_{amb} = −55 to + 100 °C	BZX90:	$\|S_Z\|$	<	0,01	%/°C
	BZX91:	$\|S_Z\|$	<	0,005	%/°C
	BZX92:	$\|S_Z\|$	<	0,002	%/°C
	BZX93:	$\|S_Z\|$	<	0,001	%/°C
	BZX94:	$\|S_Z\|$	<	0,0005	%/°C
Differential resistance at I_Z = 7,5 mA		r_{diff}	<	15	Ω

NOTE

The temperature coefficient (S_Z) of the reference voltage (V_{ref}) is obtained from the following equation:

$$S_Z = \frac{V_{ref1} - V_{ref2}}{(T_{amb2} - T_{amb1}) \times V_{ref\,nom}} \times 100\ \%/^{o}C$$

* For accuracy of I_Z see Figs. 8 and 9.

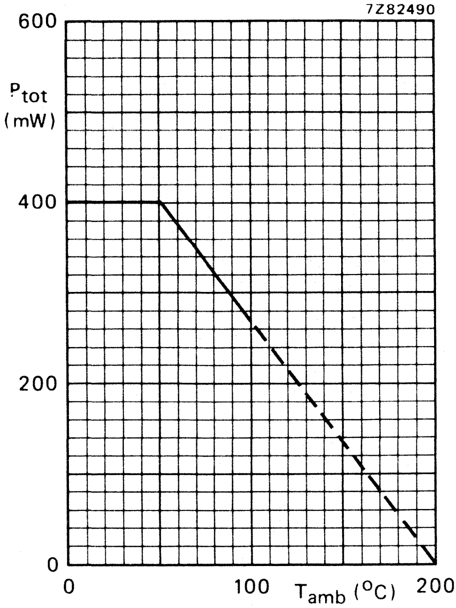


Fig. 2.

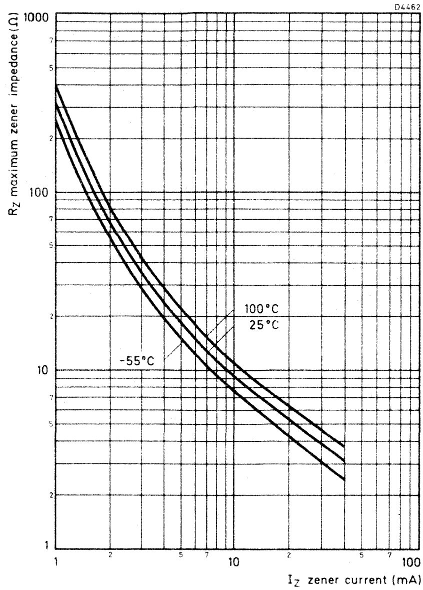


Fig. 3.

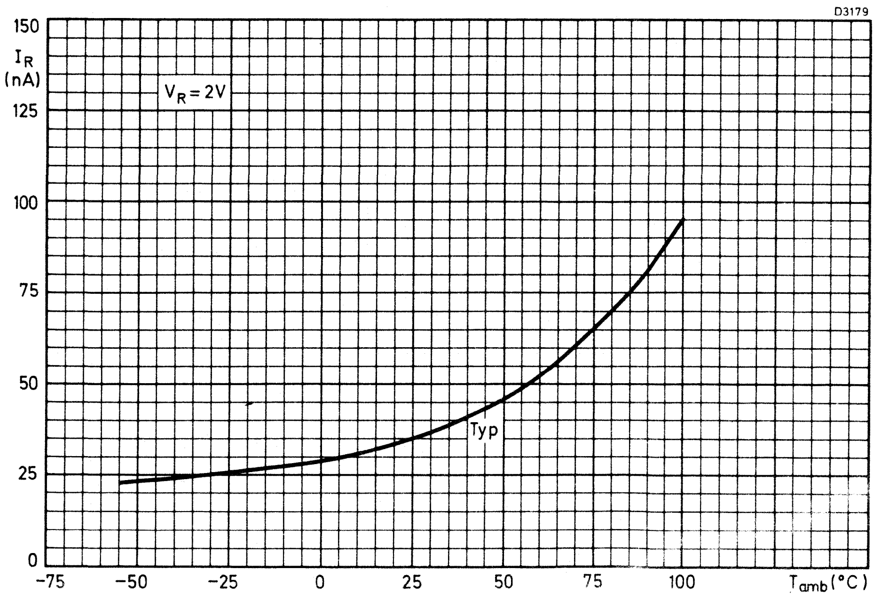


Fig. 4.

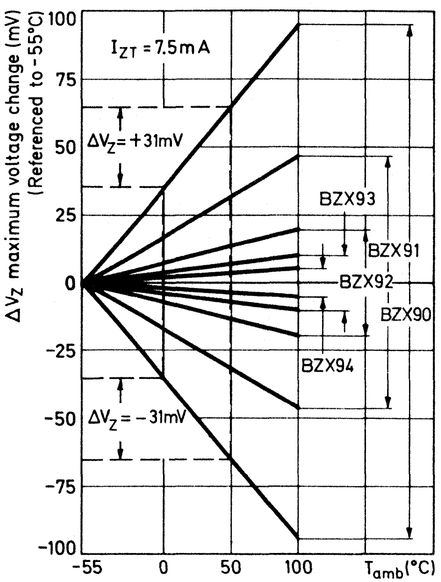


Fig. 5.

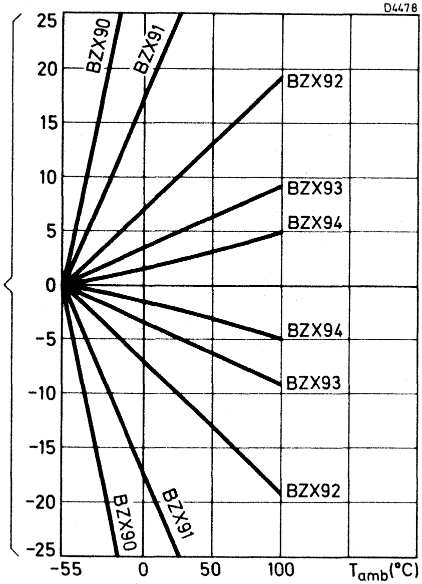


Fig. 6.

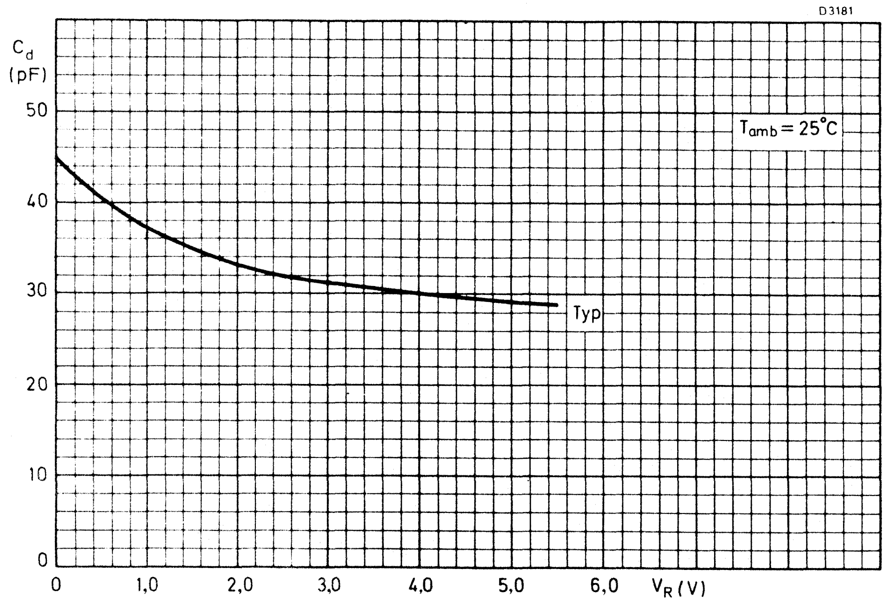


Fig. 7.

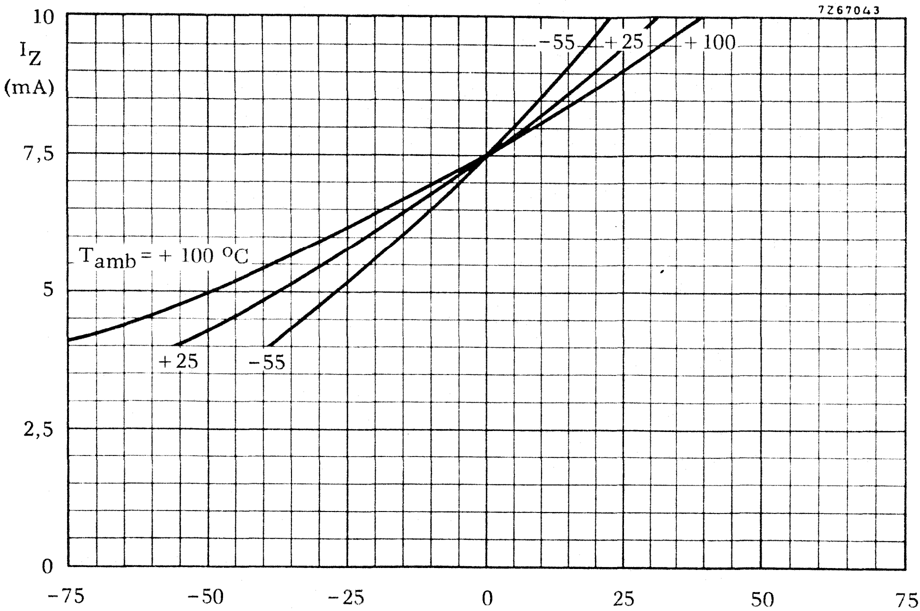


Fig. 8 Max. ΔV_{ref} (mV) (referenced to I_Z = 7,5 mA).

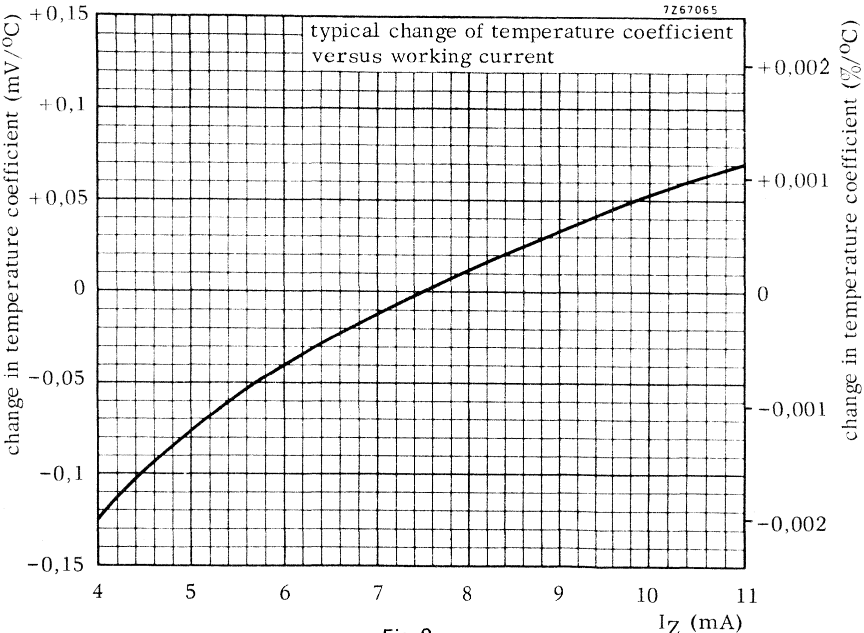


Fig. 9.

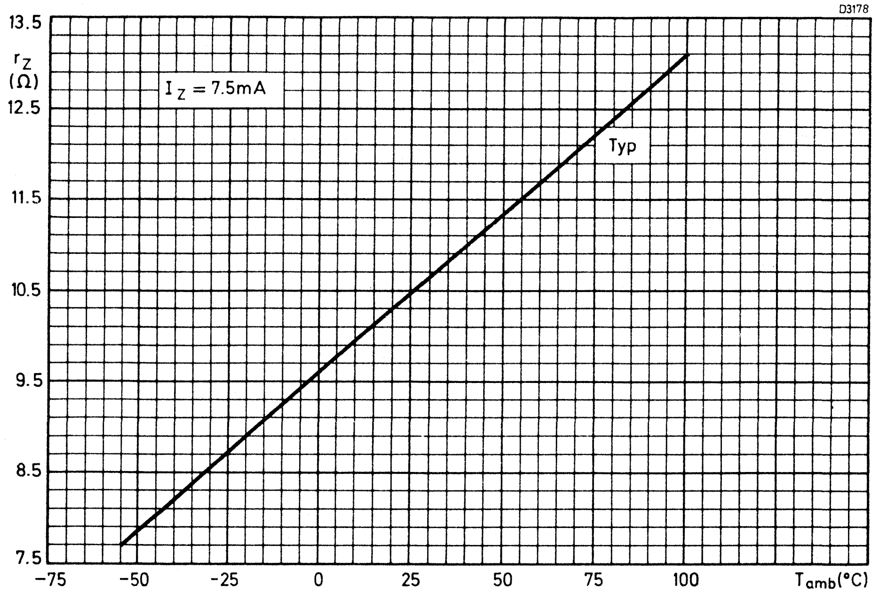

D3178
13.5
r_Z
(Ω)
12.5
11.5
10.5
9.5
8.5
7.5
$I_Z = 7.5mA$
Typ
−75
−50
−25
0
25
50
75
100
T_{amb}(°C)

Fig. 10.

VOLTAGE REFERENCE DIODES

Voltage reference diodes in a DO-34 envelope. They have a very low temperature coefficient and are primarily intended for use as voltage reference sources in measuring instruments such as digital voltmeters.

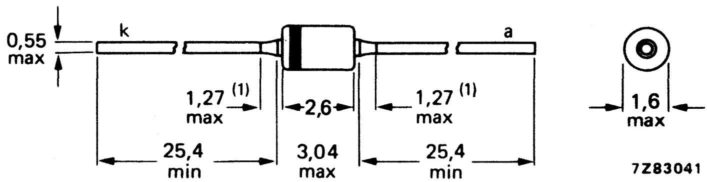
QUICK REFERENCE DATA

			min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}	5,89	6,20	6,51	V
Effective temperature coefficient at I_Z = 7,5 mA* (see notes 1 and 2 and the relevant graphs)	1N821; A	$\lvert S_Z \rvert$	<		0,01	%/K
	1N823; A	$\lvert S_Z \rvert$	<		0,005	%/K
	1N825; A	$\lvert S_Z \rvert$	<		0,002	%/K
	1N827; A	$\lvert S_Z \rvert$	<		0,001	%/K
	1N829; A	$\lvert S_Z \rvert$	<		0,0005	%/K
Operating ambient temperature		T_{amb}		−55 to + 100		°C

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

Cathode indicated by coloured band

* For accuracy of I_Z see Figs 3 to 5.

RATINGS

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

Working current (d.c.)	I_Z	max.	50	mA
Working current (peak value)	I_{ZM}	max.	50	mA
Total power dissipation up to T_{amb} = 50 °C	P_{tot}	max.	400	mW
Storage temperature	T_{stg}		−65 to + 200	°C
Operating ambient temperature	T_{amb}		−55 to + 100	°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,375	K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			min.	nom.	max.	
Reference voltage at I_Z = 7,5 mA		V_{ref}	5,89	6,20	6,51	V

Reference voltage excursion at I_Z = 7,5 mA* ambient temperature test points: −55; + 25; + 75; + 100 °C (see notes 1 and 2 and the relevant graphs)	1N821; A	$\|\Delta V_{ref}\|$	<	96	mV
	1N823; A	$\|\Delta V_{ref}\|$	<	48	mV
	1N825; A	$\|\Delta V_{ref}\|$	<	19	mV
	1N827; A	$\|\Delta V_{ref}\|$	<	9	mV
	1N829; A	$\|\Delta V_{ref}\|$	<	5	mV
Effective temperature coefficient at I_Z = 7,5 mA* (see notes 1 and 2 and the relevant graphs)	1N821; A	$\|S_Z\|$	<	0,01	%/K
	1N823; A	$\|S_Z\|$	<	0,005	%/K
	1N825; A	$\|S_Z\|$	<	0,002	%/K
	1N827; A	$\|S_Z\|$	<	0,001	%/K
	1N829; A	$\|S_Z\|$	<	0,0005	%/K
Differential resistance at I_Z = 7,5 mA					
1N821 to 1N829		r_{diff}	<	15	Ω
1N821A to 1N829A		r_{diff}	<	10	Ω

* For accuracy of I_Z see Figs 3 to 5.

Notes

1. I_Z tolerance and stability of I_Z.

   The quoted values of ΔV_{ref} are based on a constant current I_Z. Two factors can cause V_{ref} to change, namely the differential resistance r_{diff} and the temperature coefficient S_Z.

   a. As the max. r_{diff} of the device can be 15 Ω, a change of 0,01 mA in the current through the reference diode will result in a ΔV_{ref} of 0,01 mA x 15 Ω = 0,15 mV. This level of ΔV_{ref} is not significant on a 1N821 ($\Delta V_{ref} < 96$ mV), it is however very significant on a 1N829 ($\Delta V_{ref} < 5$ mV).

   b. The temperature coefficient of the reference voltage S_Z is a function of I_Z. Reference diodes are classified at the specified test current and the S_Z of the reference diode will be different at different levels of I_Z. The absolute value of I_Z is important, however, the stability of I_Z, once the level has been set, is far more significant. This applies particularly to the 1N829.

   The effect of I_Z stability on S_Z is shown in Fig. 5.

2. Voltage excursion (ΔV_{ref} and temperature coefficient).

   All reference diodes are characterized by the 'box method'. This guarantees a maximum voltage excursion (ΔV_{ref}) over the specified temperature range, at the specified test current (I_Z), verified by tests at indicated temperature points within the range. V_Z is measured and recorded at each temperature specified. The ΔV_{ref} between the highest and lowest values must not exceed the maximum ΔV_{ref} given. The temperature coefficient, therefore is given only as a reference; but may be derived from:

$$S_Z = \frac{(V_{ref\ 1} - V_{ref\ 2}) \times 100}{(T_{amb\ 2} - T_{amb\ 1}) \times V_{ref\ nom}} \ \%/K$$

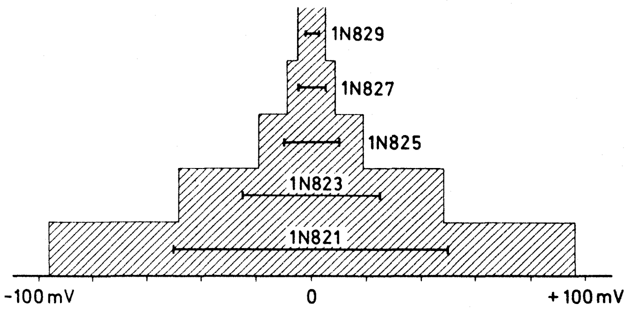


Fig. 2.

Maximum reference voltage variation (line section) caused by temperature variations within the range from −55 °C to + 100 °C at a constant working current of 7,5 mA. The voltage variations may shift horizontally within the shaded area. The zero point may vary from 5890 mV to 6510 mV and differs from diode to diode.

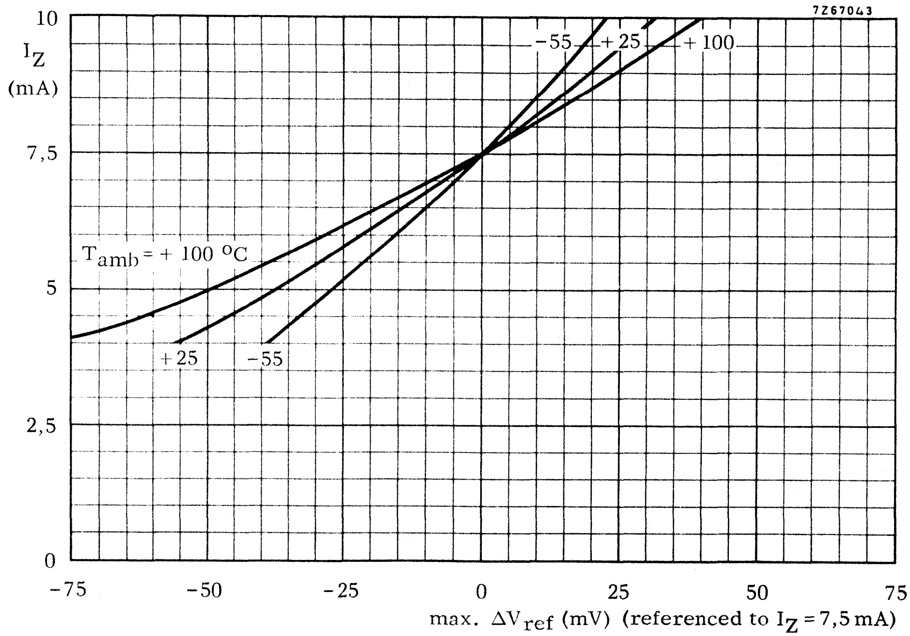


Fig. 3.

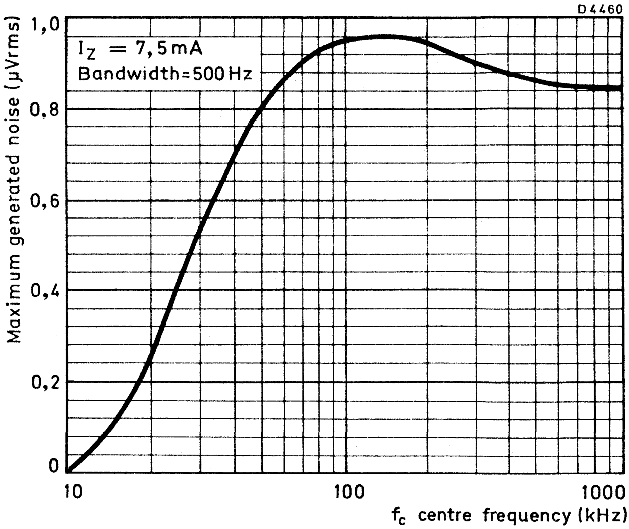

D4460
I_Z = 7,5 mA
Bandwidth = 500 Hz
Maximum generated noise (μVrms)
1,0
0,8
0,6
0,4
0,2
0
10
100
1000
f_c centre frequency (kHz)

Fig. 4.

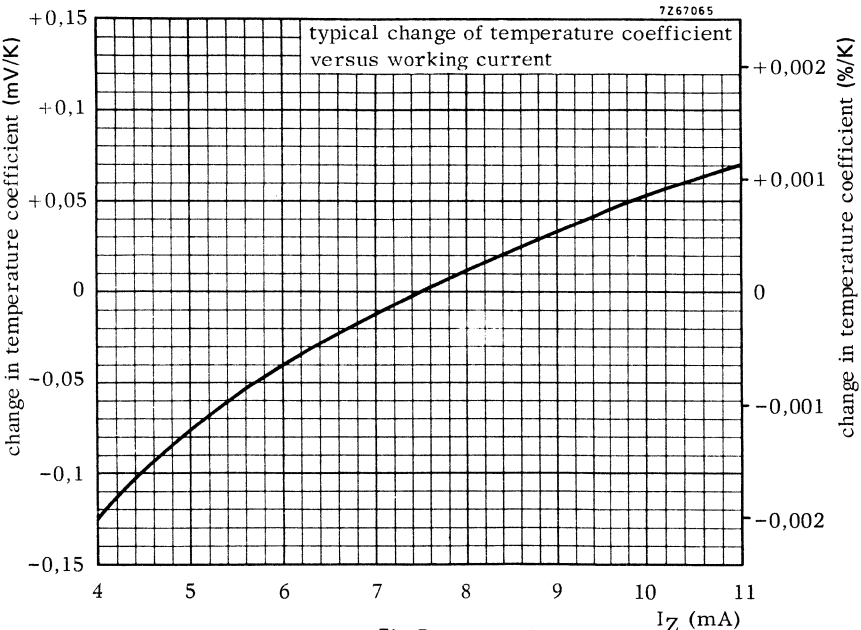

7Z67065
typical change of temperature coefficient versus working current
change in temperature coefficient (mV/K)
+0,15
+0,1
+0,05
0
−0,05
−0,1
−0,15
change in temperature coefficient (%/K)
+0,002
+0,001
0
−0,001
−0,002
4
5
6
7
8
9
10
11
I_Z (mA)

Fig. 5.

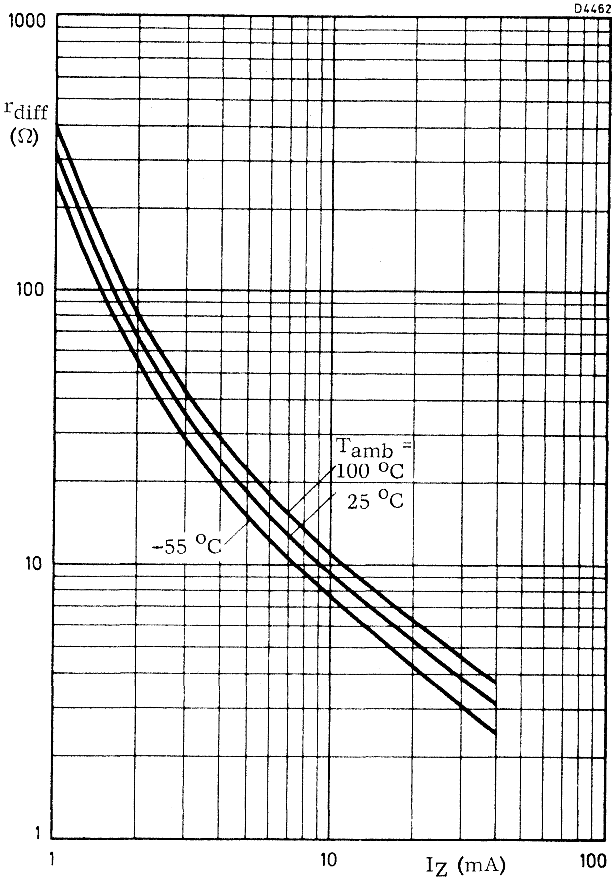


Fig. 6.

HIGH-SPEED SILICON DIODES

Planar epitaxial diodes intended for general purpose applications.

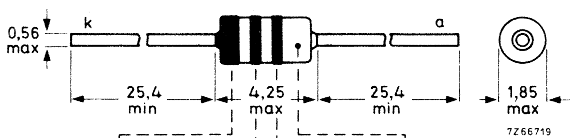
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	100	V
Repetitive peak forward current	I_{FRM}	max.	225	mA
Forward voltage $I_F = 10$ mA	V_F	<	1	V
Reverse recovery time when switched from $I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100\ \Omega$; measured at $I_R = 1$ mA	t_{rr}	<	4	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



1N914:	**white**	**brown**	**yellow**	**natural**
1N916:	**white** **(cathode)**	**brown**	**blue**	**natural**

Products approved to CECC 50 001-21 available on request.

RATINGS

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

Continuous reverse voltage	V_R	max.	75 V
Repetitive peak reverse voltage	V_{RRM}	max.	100 V
Average rectified forward current (averaged over any 20 ms period)			
T_{amb} = 25 °C	$I_{F(AV)}$	max.	75 mA
T_{amb} = 150 °C	$I_{F(AV)}$	max.	10 mA
Forward current (d.c.)	I_F	max.	75 mA
Repetitive peak forward current	I_{FRM}	max.	225 mA
Non-repetitive peak forward current (t = 1 s)	I_{FSM}	max.	500 mA
Total power dissipation	P_{tot}	max.	250 mW
Storage temperature	T_{stg}	–65 to + 200	°C
Operating ambient temperature	T_{amb}	–65 to + 175	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltages			
I_F = 10 mA	V_F	<	1 V
Reverse avalanche breakdown voltage			
I_R = 100 μA	$V_{(BR)R}$	>	100 V
Reverse currents			
V_R = 20 V	I_R	<	25 nA
V_R = 75 V	I_R	<	5 μA
V_R = 20 V; T_j = 150 °C	I_R	<	50 μA
Diode capacitance			
V_R = 0; f = 1 MHz			
1N914	C_d	<	4 pF
1N916	C_d	<	2 pF
Forward recovery voltage			
when switched to I_F = 50 mA; t_r = 20 ns	V_{fr}	<	2,5 V

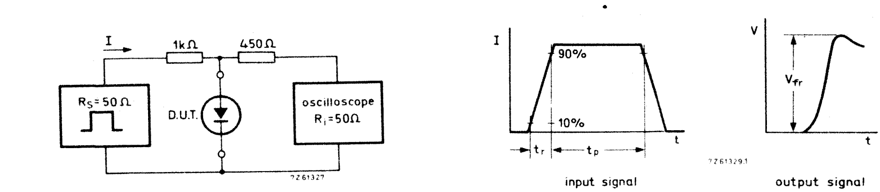
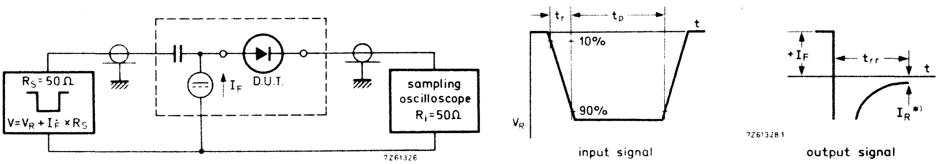


Fig. 2 Test circuit and waveforms forward recovery voltage. Input signal: Rise time of the forward pulse, t_r = 20 ns; forward current pulse duration, t_p = 120 ns; duty factor, d = 0,01. Oscilloscope rise time, t_r = 0,35 ns. Circuit capacitance < 1 pF (oscilloscope input capacitance and parasitic capacitance).

Reverse recovery time when switched from		1N914	1N916	
I_F = 10 mA to I_R = 10 mA, R_L = 100 Ω, measured at I_R = 1 mA	t_{rr}	8	—	ns
I_F = 10 mA to I_R = 60 mA, R_L = 100 Ω, measured at I_R = 1 mA	t_{rr}	4	4	ns



* I_R = 1 mA

Fig. 3 Test circuit and waveform reverse recovery time. Input signal: Rise time of the reverse pulse, t_r = 0,6 ns; reverse pulse duration, t_p = 100 ns; duty factor, d = 0,05. Oscilloscope rise time, t_r = 0,35 ns. Circuit capacitance < 1 pF (oscilloscope input capacitance + parasitic capacitance).

Rectifying efficiency

f = 100 MHz; $V_{i(rms)}$ = 2 V $\quad\quad \eta \quad\quad$ > 45 %

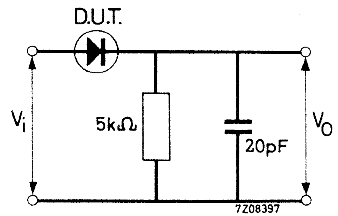


Fig. 4 Test circuit. $\eta = \frac{V_O}{V_{i(rms)}\sqrt{2}}$

SILICON DIFFUSED RECTIFIER DIODES

A range of silicon rectifier diodes for general purpose use.

QUICK REFERENCE DATA

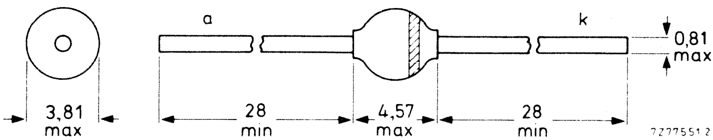
			1N4001G	4002G	4003G	4004G	4005G	4006G	4007G	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	50	100	200	400	600	800	1000	V

Average forward current	$I_{F(AV)}$	max.	1	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current	I_{FSM}	max.	30	A

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates cathode.

RATINGS

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

			1N4001G	4002G	4003G	4004G	4005G	4006G	4007G
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	200	400	600	800	1000 V
Continuous reverse voltage	V_R	max.	50	100	200	400	600	800	1000 V

Average forward current (averaged over any 20 ms period)				
up to T_{amb} = 75 °C	$I_{F(AV)}$	max.	1	A
at T_{amb} = 100 °C	$I_{F(AV)}$	max.	0,75	A
Forward current (d.c.) up to T_{amb} = 75 °C	I_F	max.	1	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current (half-cycle sinewave, 60 Hz)	I_{FSM}	max.	30	A
Storage temperature	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	175	°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm	$R_{th\ j\text{-}tp}$	=	46	K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 µm; (see "Thermal model")	$R_{th\ j\text{-}a}$	=	100	K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage I_F = 1 A	V_F	<	1,1	V
Full-cycle average forward voltage $I_{F(AV)}$ = 1 A	$V_{F(AV)}$	<	0,8	V
Reverse current				
$V_R = V_{Rmax}$	I_R	<	10	µA
$V_R = V_{Rmax}$; T_{amb} = 100 °C	I_R	<	50	µA
Full-cycle average reverse current $V_R = V_{RRMmax}$; T_{amb} = 75 °C	$I_{R(AV)}$	<	30	µA

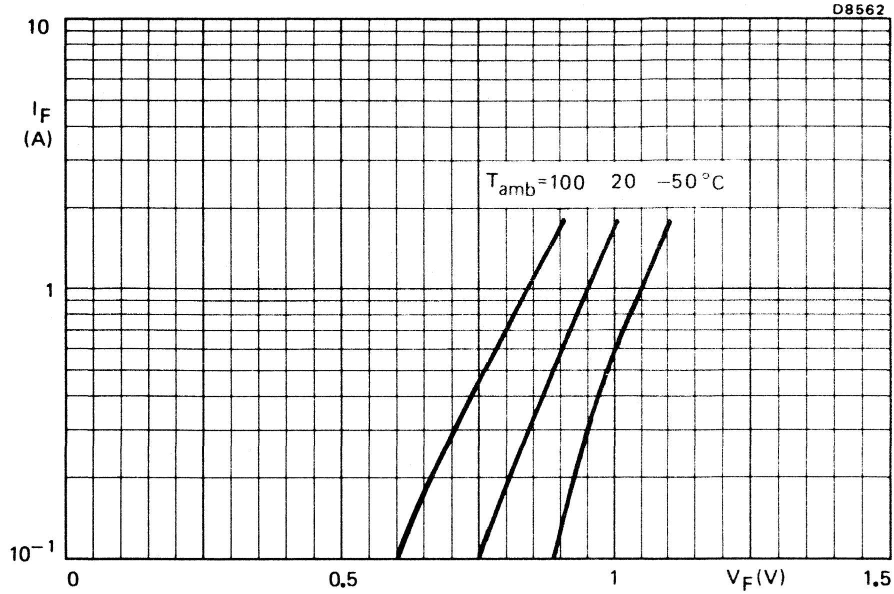


Fig. 2 Typical values.

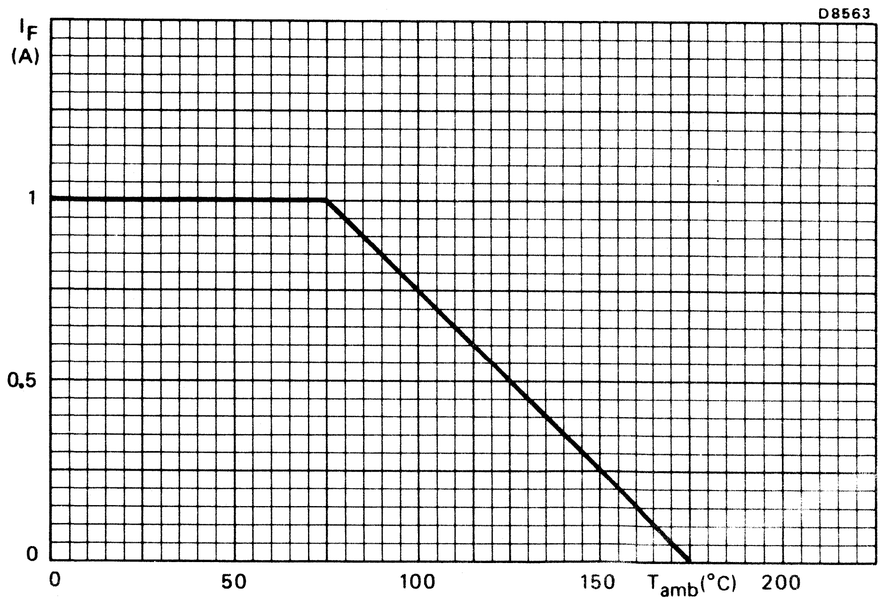


Fig. 3 Maximum permissible d.c. forward current.

HIGH-SPEED SILICON DIODES

Whiskerless diodes in subminiature DO-35 envelopes.
These diodes are primarily intended for fast logic applications.

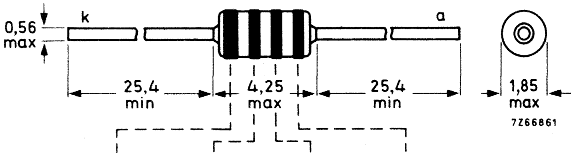
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	75 V
Repetitive peak reverse voltage	V_{RRM}	max.	75 V
Repetitive peak forward current	I_{FRM}	max.	450 mA
Forward voltage **1N4148**: I_F = 10 mA **1N4446**: I_F = 20 mA **1N4448**: I_F = 100 mA	V_F	<	1 V
Reverse recovery time when switched from I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	4 ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-27 (DO-35).



1N4148:	**yellow**	**brown**	**yellow**	**grey**
1N4446:	**yellow**	**yellow**	**yellow**	**blue**
1N4448:	**yellow** **(cathode)**	**yellow**	**yellow**	**grey**

Products, available to CECC 50 001-021, available on request.

RATINGS

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

Continuous reverse voltage	V_R	max.	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	V
Average rectified forward current	$I_{F(AV)}$	max.	150	mA
Forward current (d.c.)	I_F	max.	200	mA
Repetitive peak forward current	I_{FRM}	max.	450	mA
Non-repetitive peak forward current				
t = 1 μs	I_{FSM}	max.	2000	mA
t = 1 s	I_{FSM}	max.	500	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	500	mW
Derating factor			2,85	mW/°C
Storage temperature	T_{stg}	−65 to + 200		°C
Junction temperature	T_j	max.	200	°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

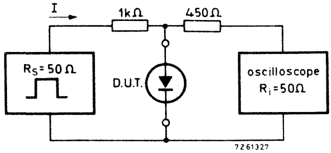
Forward voltages					
1N4148: I_F = 10 mA **1N4446**: I_F = 20 mA **1N4448**: I_F = 100 mA		V_F	<	1	V
1N4448: I_F = 5 mA		V_F	0,62 to 0,72		V
Reverse avalanche breakdown voltage					
I_R = 100 μA		$V_{(BR)R}$	>	100	V
I_R = 5 μA		$V_{(BR)R}$	>	75	V
Reverse currents					
V_R = 20 V		I_R	<	25	nA
V_R = 20 V; T_j = 100 °C	**1N4448**	I_R	<	3	μA
V_R = 20 V; T_j = 150 °C		I_R	<	50	μA
Diode capacitance					
V_R = 0; f = 1 MHz		C_d	<	4	pF

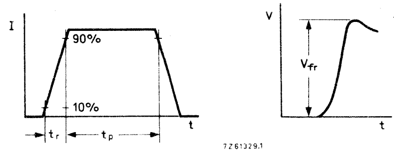
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

Forward recovery voltage when switched to

$I_F = 50$ mA; $t_r = 20$ ns V_{fr} < 2,5 V

Test circuit and waveforms:





input signal output signal

Input signal	: Rise time of the forward pulse	t_r = 20 ns
	Forward current pulse duration	t_p = 120 ns
	Duty factor	δ = 0,01
Oscilloscope	: Rise time	t_r = 0,35 ns

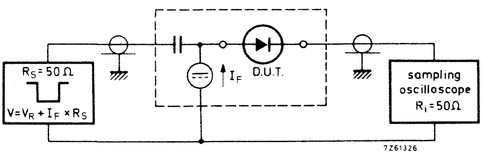
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

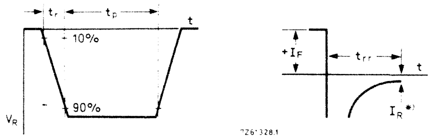
Reverse recovery time when switched from

$I_F = 10$ mA to $I_R = 60$ mA; $R_L = 100\ \Omega$;

measured at $I_R = 1$ mA t_{rr} < 4 ns

Test circuit and waveforms:





input signal output signal

Input signal	: Rise time of the reverse pulse	t_r = 0,6 ns	*) I_R = 1 mA
	Reverse pulse duration	t_p = 100 ns	
	Duty factor	δ = 0,05	
Oscilloscope	: Rise time	t_r = 0,35 ns	

Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

ULTRA-HIGH-SPEED SILICON DIODES

Whiskerless diodes in subminiature DO-35 envelopes.
The IN4150 is primarily intended for general purpose use in computer and industrial applications.
The IN4151 and IN4153 are intended for military and industrial applications.

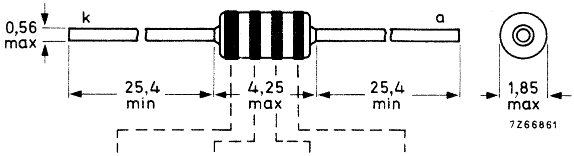
QUICK REFERENCE DATA

			IN4150	IN4151	IN4153	
Continuous reverse voltage	V_R	max.	50	50	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	75	V
Repetitive peak forward current	I_{FRM}	max.	0,60	0,45	0,45	A
Non-repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4,0	–	–	A
t = 1 s	I_{FSM}	max.	0,5	–	–	A
Forward voltage						
I_F = 20 mA	V_F	<	–	–	0,88	V
I_F = 50 mA	V_F	<	–	1	–	V
I_F = 200 mA	V_F	<	1	–	–	V
Reverse recovery time when switched from						
I_F = 400 mA to I_R = 400 mA; R_L = 100 Ω; measured at I_R = 40 mA	t_{rr}	<	6	–	–	ns
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	–	4	4	ns

MECHANICAL DATA

Dimensions in mm

DO-35



IN4150 :	yellow	brown	green	black
IN4151 :	yellow	brown	green	brown
IN4153 :	yellow	brown	green	orange
	(cathode)			

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC134)

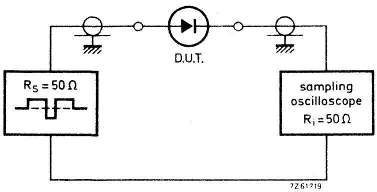
			IN4150	IN4151	IN4153	
Continuous reverse voltage	V_R	max.	50	50	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	75	V
Forward current (d.c.)	I_F	max.	0,30	0,20	0,20	A
Repetitive peak forward current	I_{FRM}	max.	0,60	0,45	0,45	A
Non-repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4,0	–	–	A
t = 1 s	I_{FSM}	max.	0,5	–	–	A
Total power dissipation up to T_{amb} = 25 ^oC	P_{tot}	max.		500		mW
Derating factor				2,85		mW/K
Storage temperature	T_{stg}			–65 to + 200		^oC
Junction temperature	T_j	max.		200		^oC

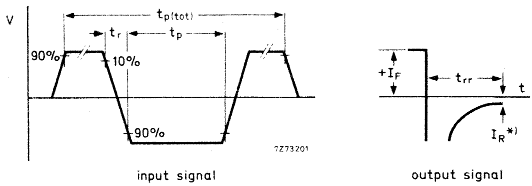
CHARACTERISTICS

T_j = 25 ^oC unless otherwise specified

			IN4150	IN4151	IN4153	
Forward voltage						
I_F = 0,1 mA	V_F	>	–	–	0,49	V
		<	–	–	0,55	V
I_F = 0,25 mA	V_F	>	–	–	0,53	V
		<	–	–	0,59	V
I_F = 1 mA	V_F	>	0,54	–	0,59	V
		<	0,62	–	0,67	V
I_F = 2 mA	V_F	>	–	–	0,62	V
		<	–	–	0,70	V
I_F = 10 mA	V_F	>	0,66	–	0,70	V
		<	0,74	–	0,81	V
I_F = 20 mA	V_F	>	–	–	0,74	V
		<	–	–	0,88	V
I_F = 50 mA	V_F	>	0,76	–	–	V
		<	0,86	1	–	V
I_F = 100 mA	V_F	>	0,82	–	–	V
		<	0,92	–	–	V
I_F = 200 mA	V_F	>	0,87	–	–	V
		<	1,00	–	–	V
Reverse avalanche breakdown voltage						
I_R = 5 μA	$V_{(BR)R}$	>	–	75	75	V
Reverse current						
V_R = 50 V	I_R	<	0,1	0,05	0,05	μA
V_R = 50 V; T_{amb} = 150 ^oC	I_R	<	100	50	50	μA

			1N4150	1N4151	1N4153
Diode capacitance $V_R = 0$; f = 1 MHz	C_d	<	2,5	2	2 pF
Reverse recovery time when switched from I_F = 10 to 200 mA to I_R = 10 to 200 mA; $R_L = 100\ \Omega$; measured at $I_R = 0{,}1 \times I_F$	t_{rr}	<	4	—	— ns
I_F = 200 to 400 mA to I_R = 200 to 400 mA; $R_L = 100\ \Omega$; measured at $I_R = 0{,}1 \times I_F$	t_{rr}	<	6	—	— ns
I_F = 10 mA to I_R = 1 mA; $R_L = 100\ \Omega$; measured at I_R = 0,1 mA	t_{rr}	<	6	—	— ns
I_F = 10 mA to I_R = 10 mA; $R_L = 100\ \Omega$; measured at I_R = 1 mA	t_{rr}	<	—	4	4 ns
I_F = 10 mA to I_R = 60 mA; $R_L = 100\ \Omega$; measured at I_R = 1 mA	t_{rr}	<	—	2	2 ns





*) value at which t_{rr} is measured

Fig. 2 Testcircuit and waveforms.

Input signal :	Total pulse duration	$t_{p(tot)}$	=	0,2 μs
	Duty factor	δ	=	0,0025
	Rise time of the reverse pulse	t_r	=	0,6 ns
	Reverse pulse duration	t_p	=	30 ns
Oscilloscope:	Rise time	t_r	=	0,35 ns

Circuit capacitance $C \leqslant 1$ pF (C = oscilloscope input capacitance + parasitic capacitance)

Forward recovery time when switched from
I = 0 to I_F = 200 mA; t_r = 0,4 ns; t_p = 100 ns; $\delta < 0{,}01$;
measured at V_f = 1 V $\quad t_{fr} \quad < \quad$ 10 ns

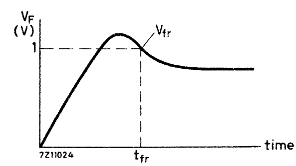


Fig. 3 1N4150.

HIGH-SPEED SILICON DIODES

Diodes in the sub-miniature DO-34 envelope intended for fast logic and general purpose applications. Because of their small size the diodes are especially suitable for mounting in miniature assemblies e.g. as protection diodes in reed relays, etc.

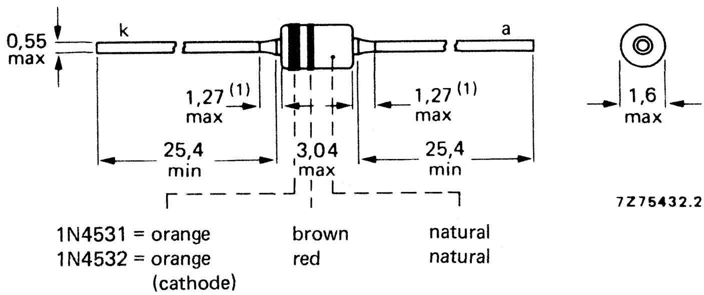
QUICK REFERENCE DATA

			1N4531	1N4532	
Continuous reverse voltage	V_R	max.	75	75	V
Repetitive peak forward current	I_{FRM}	max.	450		mA
Junction temperature	T_j	max.	200		°C
Forward voltage at I_F = 10 mA	V_F	<	1,0		V
Reverse recovery time					
when switched from I_F = 10 mA to I_R = 60 mA	t_{rr}	<	4	2	ns
when switched from I_F = 10 mA to I_R = 10 mA	t_{rr}	<	–	4	ns

MECHANICAL DATA

Dimensions in mm

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



(1) Lead diameter in this zone uncontrolled.

The diodes are suitable for mounting on a 2E (5,08 mm) pitch.

RATINGS

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

			1N4531	1N4532	
Continuous reverse voltage	V_R	max.	75	75	V
Repetitive peak reverse voltage	V_{RRM}	max.	75	75	V
Average rectified forward current	$I_{F(AV)}$	max.	150		mA
Forward current (d.c.)	I_F	max.	200		mA
Repetitive peak forward current	I_{FRM}	max.	450		mA
Non-repetitive peak forward current					
($t \leqslant 1\ \mu s$)	I_{FSM}	max.	2000		mA
($t \leqslant 1$ s)	I_{FSM}	max.	500		mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	500		mW
Storage temperature	T_{stg}		−65 to + 200		°C
Junction temperature	T_j	max.	200		°C

THERMAL RESISTANCE

From junction to ambient in free air	$R_{th\ j\text{-}a}$	=	0,35	K/mW

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			1N4531	1N4532	
Forward voltage					
I_F = 10 mA	V_F	<	1,0		V
Reverse breakdown voltage					
I_R = 100 μA	$V_{(BR)R}$	>	100	–	V
I_R = 5 μA	$V_{(BR)R}$	>	75	75	V
Reverse current					
V_R = 20 V	I_R	<	25	–	nA
V_R = 20 V; T_j = 150 °C	I_R	<	50	–	μA
V_R = 50 V	I_R	<	–	100	nA
V_R = 50 V; T_j = 150 °C	I_R	<	–	100	μA
Diode capacitance					
V_R = 0; f = 1 MHz	C_d	<	4	2	pF

Forward recovery voltage for 1N4532
when switched to I_F = 100 mA at $t_r \leqslant$ 30 ns — V_{fr} < 3 V

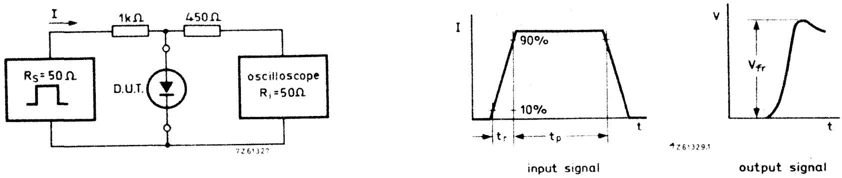


Fig. 2 Test circuit and waveforms.

Input signal:	rise time of the forward pulse	t_r = 30 ns
	forward current pulse duration	t_p = 120 ns
	duty factor	δ = 0,01
Oscilloscope:	rise time	t_r = 0,35 ns

Circuit capacitance C $\leqslant$ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

Reverse recovery time when switched from:			1N4531	1N4532	
I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	4	2	ns
I_F = 10 mA to I_R = 10 mA; R_L = 100 Ω measured at I_R = 1 mA	t_{rr}	<	–	4	ns

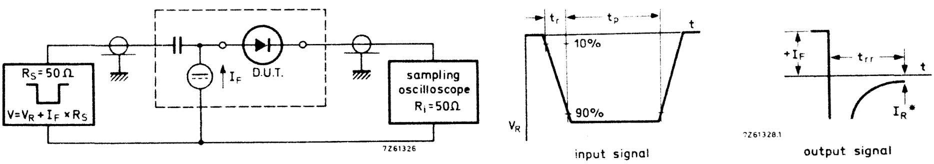


Fig. 3 Test circuit and waveforms.

* I_R = 1 mA

Input signal:	rise time of the reverse pulse	t_r = 0,6 ns
	reverse pulse duration	t_p = 100 ns
	duty factor	δ = 0,05
Oscilloscope:	rise time	t_r = 0,35 ns

Circuit capacitance C $\leqslant$ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

CONTROLLED AVALANCHE RECTIFIER DIODES

Double-diffused glass passivated rectifier diodes in hermetically sealed axial-leaded glass envelopes, capable of absorbing reverse transients.

They are intended for rectifier applications as well as general purpose applications in television and communication equipment.

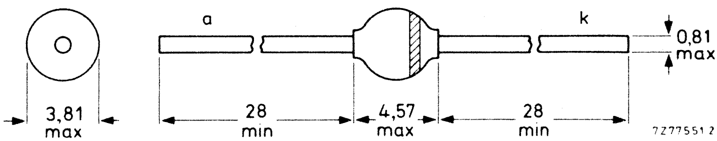
QUICK REFERENCE DATA

			1N5059	5060	5061	5062	
Crest working reverse voltage	V_{RWM}	max.	200	400	600	800	V
Reverse avalanche breakdown voltage	$V_{(BR)R}$	>	225	450	650	900	V
		<	1600	1600	1600	1600	V
Average forward current	$I_{F(AV)}$	max.	2,0				A
Non-repetitive peak forward current	I_{FSM}	max.	50				A
Non-repetitive peak reverse power dissipation	P_{RSM}	max.	1				kW
Junction temperature	T_j	max.	175				°C ←

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-57.



The marking band indicates the cathode.

Products approved to CECC 50 008-015 available on request.

RATINGS

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

			1N5059	5060	5061	5062	
Crest working reverse voltage	V_{RWM}	max.	200	400	600	800	V
Continuous reverse voltage	V_R	max.	200	400	600	800	V
Average forward current (averaged over any 20 ms period)							
T_{tp} = 35 °C; lead length 10 mm	$I_{F(AV)}$	max.	2,0				A
T_{amb} = 75 °C; Fig. 2	$I_{F(AV)}$	max.	0,8				A
Repetitive peak forward current	I_{FRM}	max.	12				A
Non-repetitive peak forward current t = 10 ms; half sine-wave; see Figs 7 and 10	I_{FSM}	max.	50				A
Non-repetitive peak reverse power dissipation							
t = 20 μs (half sine-wave) $T_j = T_{j\,max}$ prior to surge	P_{RSM}	max.	1				kW
t = 100 μs (half sine-wave) $T_j = T_{j\,max}$ prior to surge	P_{RSM}	max.	450				W
Storage temperature	T_{stg}		−65 to + 175				°C
→ Junction temperature	T_j	max.	175				°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point at a lead length of 10 mm — $R_{th\,j\text{-}tp}$ = 46 K/W
2. Thermal resistance from junction to ambient when mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (see "Thermal model") — $R_{th\,j\text{-}a}$ = 100 K/W

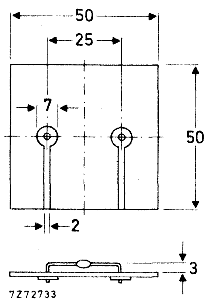


Fig. 2 Device mounted on a printed circuit board.

CHARACTERISTICS

			1N5059	5060	5061	5062	
Forward voltage; T_j = 25 °C *							
I_F = 1 A	V_F	<	1	1	1	1	V
I_F = 2,5 A	V_F	<	1,15	1,15	1,15	1,15	V
Reverse avalanche breakdown voltage							
I_R = 0,1 mA; T_j = 25 °C	$V_{(BR)R}$	>	225	450	650	900	V
		<	1600	1600	1600	1600	V
Reverse current							
$V_R = V_{RWMmax}$; T_j = 25 °C **	I_R	<	1,0	1,0	1,0	1,0	µA
$V_R = V_{RWMmax}$; T_j = 100 °C	I_R	<	10	10	10	10	µA
$V_R = V_{RWMmax}$; T_j = 165°C	I_R	<	150	150	150	150	µA

Reverse recovery time when switched from I_F = 0,5 A to I_R = 1 A at i_{rr} = 0,25 A	t_{rr}	<	6	µs
		typ.	3	µs

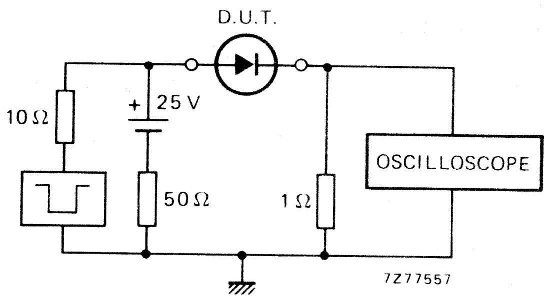


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ≤ 7 ns.
Source impedance 50 Ω. Rise time ≤ 15 ns.

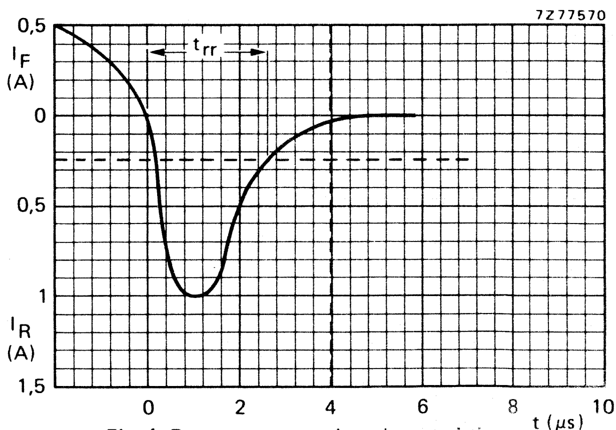


Fig. 4 Reverse recovery time characteristic.

Measured under pulse conditions to avoid excessive dissipation.
* Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

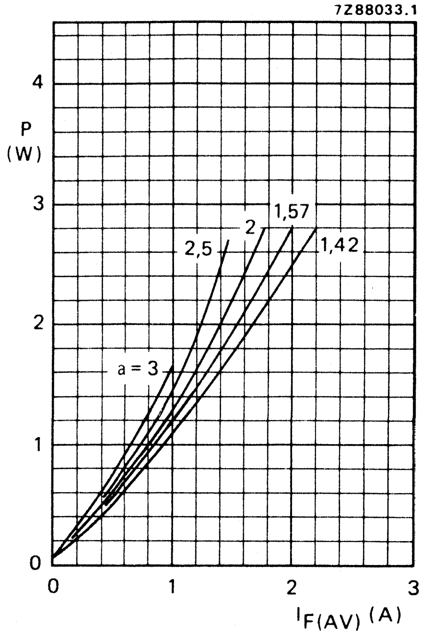


Fig. 5 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

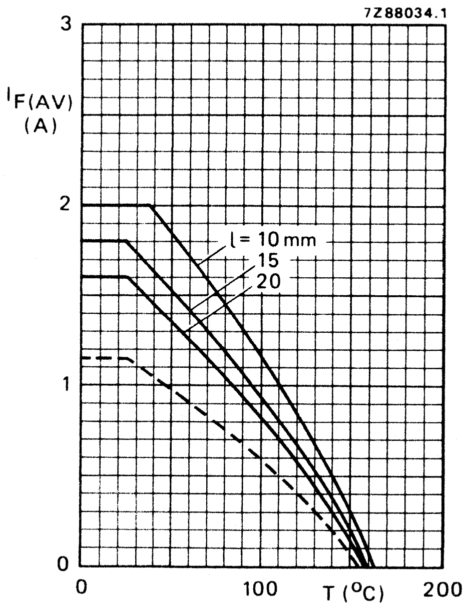


Fig. 6 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.
a = 1,57; $V_R = V_{RWMmax}$; l = lead length
——— T = tie-point temperature
– – – – T = ambient temperature and device mounted as shown in Fig. 2.

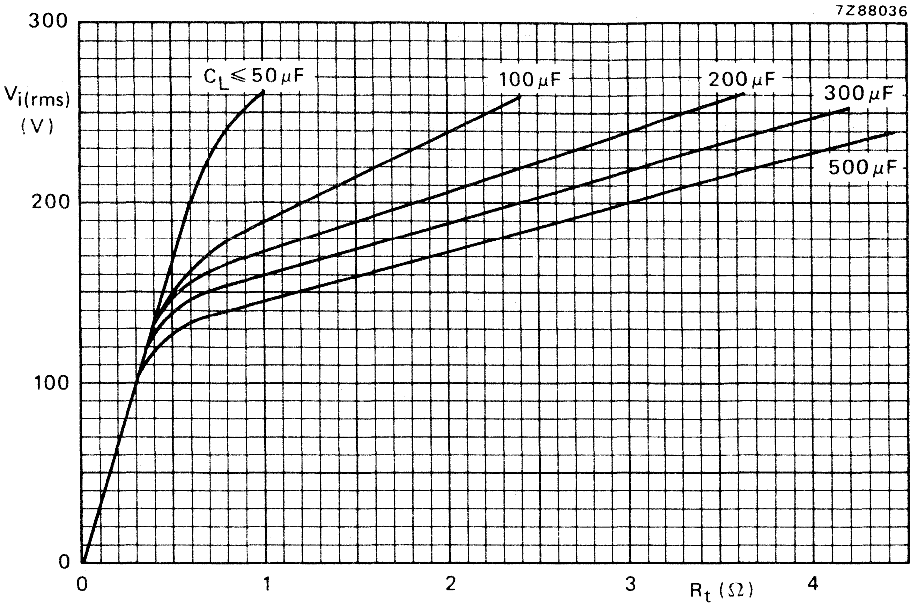


Fig. 7 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

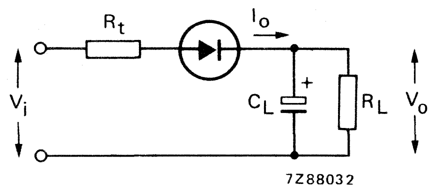


Fig. 8 Test circuit series resistance (R_t).

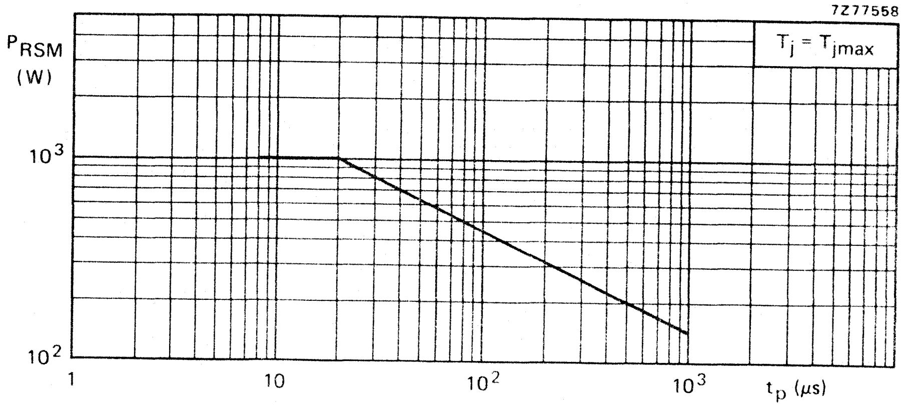
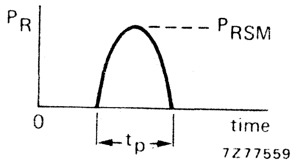


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



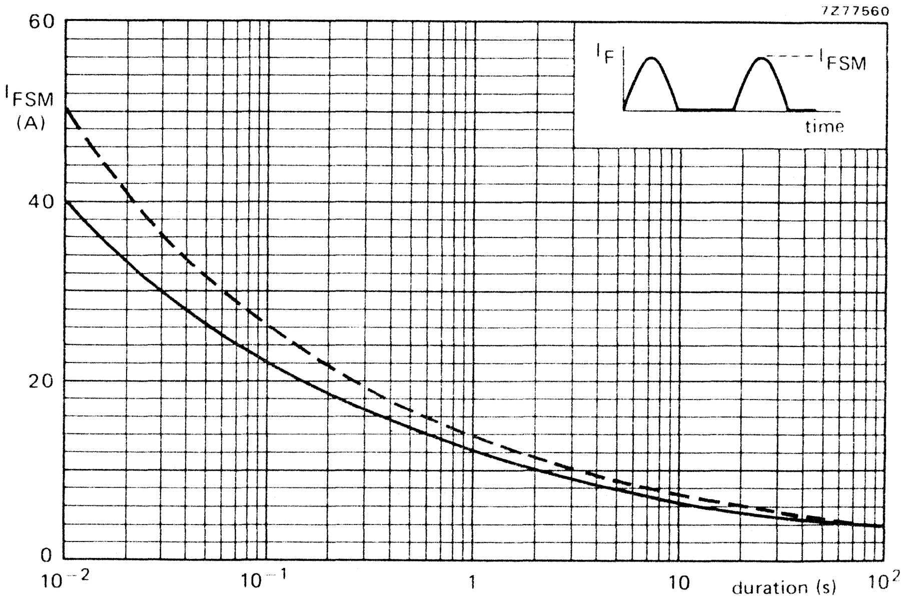


Fig. 10 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz).
– – – T_j = 25 °C; $V_R = 0$
—— $T_j = T_{j\,max}$ prior to surge, $V_R = V_{RWMmax}$.

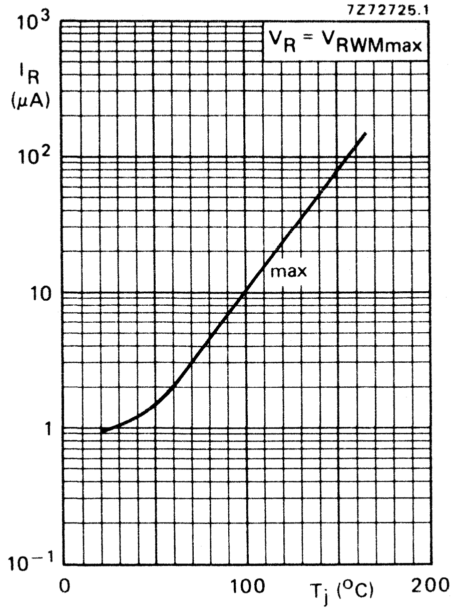


Fig. 11.

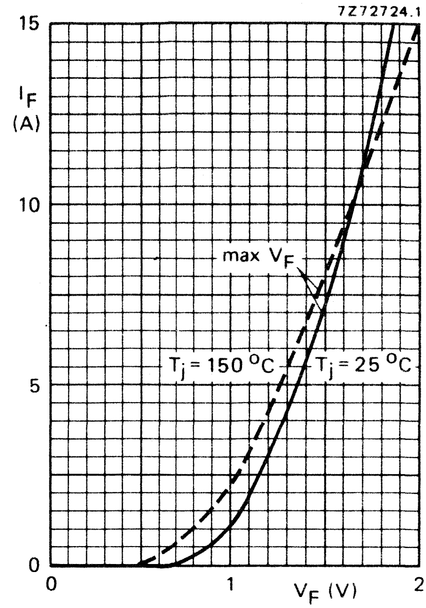


Fig. 12.

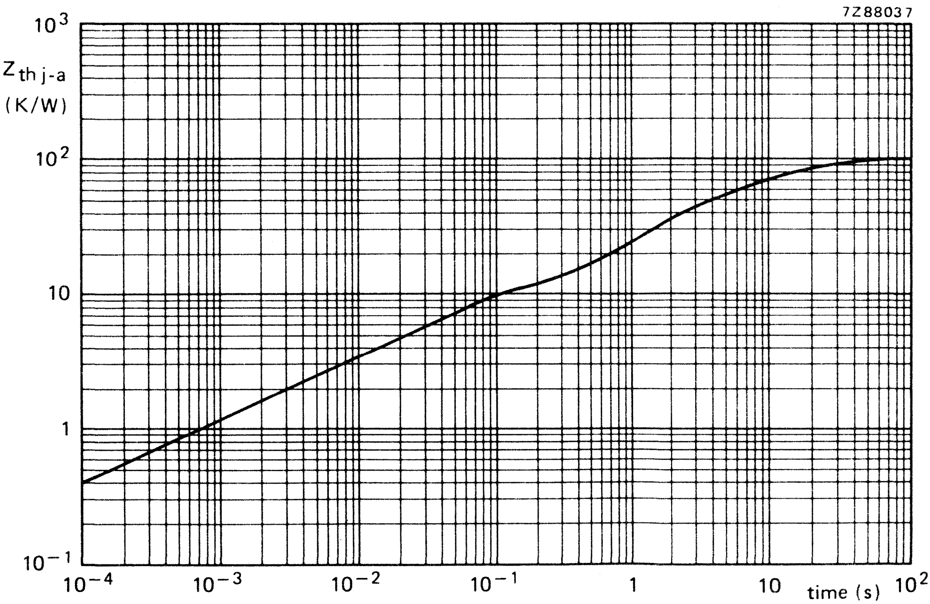
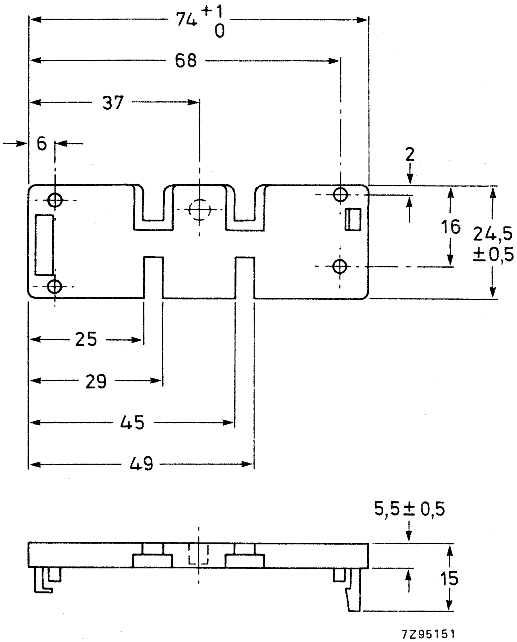


Fig. 13 Device mounted on a printed circuit board (see Fig. 2).

ADAPTOR SOCKET
56397

MECHANICAL DATA

Dimensions in mm



This adaptor enables a BG2000 type tripler to be mounted into a BG1895 mounting base. It clips into the BG2000 and has the same fitting holes as a BG1895 tripler.

CONVERSION LIST
TYPE NUMBER TO CATALOGUE NUMBER

BA220	9331 608 60113
BA221	9331 608 70113
BA223	9335 029 00113
BA281	9336 424 70113
BA314	9332 083 70113
BA315	9332 083 80113
BA316	9332 083 90113
BA317	9332 084 00113
BA318	9332 084 10113
BA423	9335 722 80113
BA480	9336 247 20112
BA481	9336 386 30113
BA482	9334 632 90113
BA483	9334 633 00113
BA484	9336 136 20113
BA682	9337 532 70115
BA683	9337 532 80115
BAS11	9322 979 90113
BAS15	9334 304 40113
BAS16	9334 606 20112
BAS17	9335 262 30112
BAS19	9335 020 20112
BAS20	9335 020 30112
BAS21	9335 020 40112
BAS28	9336 791 70115
BAS29	9337 231 80115
BAS31	9337 231 90115
BAS32	9336 992 70115
BAS35	9337 232 00115
BAS45	9336 752 90113
BAS56	9337 423 10115
BAT17	9334 107 00112
BAT18	9334 107 10112
BAT54	9337 422 80115
BAT74	9337 422 90115
BAT81	9336 247 30113
BAT82	9336 247 40113
BAT83	9336 247 50113
BAT85	9336 247 60113
BAT86	9336 247 70113
BAV10	9331 185 60113
BAV18	9331 607 30113
BAV19	9331 891 90113
BAV20	9331 892 00113
BAV21	9331 892 10113
BAV23	9337 207 70115
BAV45	9331 569 50113
BAV70	9331 849 10112
BAV99	9332 153 70112
BAV100	9336 993 30115
BAV101	9336 993 40115
BAV102	9336 993 50115
BAV103	9336 993 60115
BAW56	9330 989 90112
BAW62	9331 012 20113
BAX12	9330 127 70113
BAX14	9330 228 70113
BAX18	9330 229 10113
BAY80	9330 684 20113
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BBY40	9335 053 10112
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BG2097-641	on request
BG2097-642	on request
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BY438	9335 001 10113
BY448	9335 001 20113
BY458	9335 001 30113

BY505	9336 363 30113	BYV28-50	9335 535 80113
BY509	9334 733 00113	BYV28-100	9335 535 90113
BY527	9335 810 10113	BYV28-150	9335 536 00113
BY584	9336 123 20113	BYV28-200	9335 536 10113
BY588	9336 718 40113	BYV36A	9337 309 60113
BY609	9336 235 50113	BYV36B	9337 309 70113
BY610	9336 235 60113	BYV36C	9337 309 80113
BY614	9337 246 30113	BYV36D	9337 309 90113
BY619	9337 159 00113	BYV36E	9337 310 00113
BY620	9337 159 10113	BYV95A	9335 000 90113
BY707	9336 906 30113	BYV95B	9335 001 70113
BY708	9336 906 40113	BYV95C	9335 001 80113
BY709	9336 906 50113	BYV96D	9335 001 00113
BY710	9336 906 60113	BYV96E	9335 001 90113
BY711	9336 906 70113	BYW54	9333 636 10113
BY712	9336 723 80113	BYW55	9333 636 20113
BY713	9336 723 90113	BYW56	9333 636 30113
BY714	9337 112 90113	BYW95A	9335 000 70113
BYD13D	9337 377 30113	BYW95B	9335 001 40113
BYD13G	9337 377 40113	BYW95C	9335 001 50113
BYD13J	9337 377 50113	BYW96D	9335 000 80113
BYD13K	9337 377 60113	BYW96E	9335 001 60113
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BYD33G	9337 234 10113	BZD23-C4V3	9337 533 00113
BYD33J	9337 234 20113	BZD23-C4V7	9337 533 10113
BYD73A	9337 537 40113	BZD23-C5V1	9337 533 20113
BYD73B	9337 537 50113	BZD23-C5V6	9337 533 30113
BYD73C	9337 537 60113	BZD23-C6V2	9337 533 40113
BYD73D	9337 537 70113	BZD23-C6V8	9337 533 50113
BYD73E	9337 537 80113	BZD23-C7V5	9337 533 60113
BYD73F	9337 537 90113	BZD23-C8V2	9337 533 70113
BYD73G	9337 538 00113	BZD23-C9V1	9337 533 80113
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BYM56B	9337 343 20113	BZD23-C11	9337 534 00113
BYM56C	9337 343 30113	BZD23-C12	9337 534 10113
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BYM56E	9337 343 50113	BZD23-C15	9337 534 30113
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BYV26D	9337 036 90113	BZD23-C30	9337 535 00113
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BZV55-C16	9336 995 70115	BZW03-C11	9336 582 10113
BZV55-C18	9336 995 80115	BZW03-C12	9336 582 20113
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BZV55-C22	9336 996 00115	BZW03-C15	9336 582 40113
BZV55-C24	9336 996 10115	BZW03-C16	9336 582 50113
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BZV55-C39	9336 996 60115	BZW03-C27	9336 583 00113
BZV55-C43	9336 997 00115	BZW03-C30	9336 583 10113
BZV55-C47	9336 997 10115	BZW03-C33	9336 583 20113
BZV55-C51	9336 997 20115	BZW03-C36	9336 583 30113
BZV55-C56	9336 997 30115	BZW03-C39	9336 583 40113
BZV55-C62	9336 997 40115	BZW03-C43	9336 583 50113
BZV55-C68	9336 997 50115	BZW03-C47	9336 583 60113
BZV55-C75	9336 997 60115	BZW03-C51	9336 583 70113
BZV85-C5V1	9335 005 80113	BZW03-C56	9336 583 80113
BZV85-C5V6	9335 005 90113	BZW03-C62	9336 583 90113
BZV85-C6V2	9335 006 00113	BZW03-C68	9336 584 00113
BZV85-C6V8	9335 006 10113	BZW03-C75	9336 584 10113
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BZV85-C12	9335 006 70113	BZW03-C130	9336 584 70113
BZV85-C13	9335 006 80113	BZW03-C150	9336 584 80113
BZV85-C15	9335 006 90113	BZW03-C160	9336 584 90113
BZV85-C16	9335 007 00113	BZW03-C180	9336 585 00113
BZV85-C18	9335 007 10113	BZW03-C200	9336 585 10113
BZV85-C20	9335 007 20113	BZW03-C220	9336 585 20113

BZW03-C240	9336 585 30113
BZW03-C270	9336 585 40113
BZX55-C4V7	9332 073 90113
BZX55-C5V1	9332 466 90113
BZX55-C5V6	9332 398 10113
BZX55-C6V2	9332 467 20113
BZX55-C6V8	9332 467 30113
BZX55-C7V5	9332 398 20113
BZX55-C8V2	9332 409 00113
BZX55-C9V1	9332 470 80113
BZX55-C10	9332 470 90113
BZX55-C11	9332 467 40113
BZX55-C12	9332 398 30113
BZX55-C13	9332 398 40113
BZX55-C15	9332 467 00113
BZX55-C16	9332 471 00113
BZX55-C18	9332 398 50113
BZX55-C20	9332 471 10113
BZX55-C22	9332 471 20113
BZX55-C24	9332 471 30113
BZX55-C27	9332 471 40113
BZX55-C30	9332 471 50113
BZX55-C33	9332 471 60113
BZX55-C36	9332 727 30113
BZX55-C39	9332 727 40113
BZX55-C43	9332 727 50113
BZX55-C47	9332 727 60113
BZX55-C51	9332 727 70113
BZX55-C56	9332 727 80113
BZX55-C62	9332 727 90113
BZX55-C68	9332 728 00113
BZX55-C75	9332 728 10113
BZX79-B2V4	9335 499 30113
BZX79-B2V7	9335 442 40113
BZX79-B3V0	9335 499 40113
BZX79-B3V3	9335 499 50113
BZX79-B3V6	9335 499 60113
BZX79-B3V9	9334 711 00113
BZX79-B4V3	9335 499 70113
BZX79-B4V7	9331 668 00113
BZX79-B5V1	9331 668 10113
BZX79-B5V6	9331 668 20113
BZX79-B6V2	9331 668 30113
BZX79-B6V8	9331 608 90113
BZX79-B7V5	9331 668 40113
BZX79-B8V2	9331 668 50113
BZX79-B9V1	9331 668 60113
BZX79-B10	9331 668 70113
BZX79-B11	9331 668 80113
BZX79-B12	9331 668 90113
BZX79-B13	9331 669 00113
BZX79-B15	9331 669 10113
BZX79-B16	9331 669 20113
BZX79-B18	9331 669 30113
BZX79-B20	9331 669 40113
BZX79-B22	9331 669 50113
BZX79-B24	9331 669 60113
BZX79-B27	9331 669 70113
BZX79-B30	9331 669 80113
BZX79-B33	9331 669 90113
BZX79-B36	9331 670 00113
BZX79-B39	9331 670 10113
BZX79-B43	9331 670 20113
BZX79-B47	9331 670 30113
BZX79-B51	9331 670 40113
BZX79-B56	9331 670 50113
BZX79-B62	9331 670 60113
BZX79-B68	9331 670 70113
BZX79-B75	9331 670 80113
BZX79-C2V4	9334 146 80113
BZX79-C2V7	9332 988 20113
BZX79-C3V0	9334 146 90113
BZX79-C3V3	9331 176 70113
BZX79-C3V6	9331 176 80113
BZX79-C3V9	9331 176 90113
BZX79-C4V3	9331 177 00113
BZX79-C4V7	9331 177 10113
BZX79-C5V1	9331 177 20113
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BZX79-C30	9331 179 00113
BZX79-C33	9331 179 10113
BZX79-C36	9331 179 20113
BZX79-C39	9331 179 30113
BZX79-C43	9331 179 40113

BZX79-C47	9331 179 50113	BZX84-C62	9333 884 10112
BZX79-C51	9331 179 60113	BZX84-C68	9333 884 20112
BZX79-C56	9331 179 70113	BZX84-C75	9333 884 30112
BZX79-C62	9331 179 80113	BZX90	9331 728 50113
BZX79-C68	9331 179 90113	BZX91	9331 728 60113
BZX79-C75	9331 180 00113	BZX92	9331 728 70113
BZX84-C2V4	9335 169 20112	BZX93	9331 728 80113
BZX84-C2V7	9335 169 30112	BZX94	9331 728 90113
BZX84-C3V0	9335 169 40112	1N821	9330 447 90113
BZX84-C3V3	9335 169 50112	1N821A	9332 206 70113
BZX84-C3V6	9335 169 60112	1N823	9331 119 40113
BZX84-C3V9	9335 169 70112	1N823A	9331 700 60113
BZX84-C4V3	9335 169 80112	1N825	9331 051 90113
BZX84-C4V7	9331 373 80112	1N825A	9332 201 90113
BZX84-C5V1	9331 373 90112	1N827	9330 448 00113
BZX84-C5V6	9331 374 00112	1N827A	9332 009 10113
BZX84-C6V2	9331 374 10112	1N829	9331 599 40113
BZX84-C6V8	9331 374 20112	1N829A	9331 462 50113
BZX84-C7V5	9331 374 30112	1N914	9330 599 50113
BZX84-C8V2	9331 374 40112	1N916	9330 473 10113
BZX84-C9V1	9331 374 50112	1N4001G	9334 981 90113
BZX84-C10	9331 374 60112	1N4002G	9334 982 00113
BZX84-C11	9331 374 70112	1N4003G	9334 982 10113
BZX84-C12	9331 374 80112	1N4004G	9334 982 20113
BZX84-C13	9333 882 50112	1N4005G	9334 982 30113
BZX84-C15	9333 882 60112	1N4006G	9334 982 40113
BZX84-C16	9333 882 70112	1N4007G	9334 982 50113
BZX84-C18	9333 882 80112	1N4148	9330 839 90113
BZX84-C20	9333 882 90112	1N4150	9331 214 60113
BZX84-C22	9333 883 00112	1N4151	9331 126 70113
BZX84-C24	9333 883 10112	1N4154	9330 599 30113
BZX84-C27	9333 883 20112	1N4446	9331 126 60113
BZX84-C30	9333 883 30112	1N4448	9331 203 50113
BZX84-C33	9333 883 40112	1N4531	9332 039 80113
BZX84-C36	9333 883 50112	1N4532	9335 158 60113
BZX84-C39	9333 883 60112	1N5059	9330 764 40113
BZX84-C43	9333 883 70112	1N5060	9332 518 60113
BZX84-C47	9333 883 80112	1N5061	9332 060 80113
BZX84-C51	9333 883 90112	1N5062	9330 764 50113
BZX84-C56	9333 884 00112		

Notes

marking : 10th digit
1 = standard (as listed).
6 = delivery to CECC specification.

packing : 11th and 12th digit
12 = bulk packed
13 = tape axial 52 mm; reel packed (as listed).
15 = 8 mm surface-mount packing
16 = tape radial, reel packed.

INDEX OF TYPE NUMBERS

Data Handbooks Semiconductor Devices

The inclusion of a type number in this publication does not necessarily imply its availability.

Mm = Microminiature semiconductors for hybrid circuits
SD = Small-signal diodes
Sp = Special diodes
T = Tuner diodes
Vrg = Voltage regulator diodes

* = series
FET = Field-effect transistors
Mm = Microminiature semiconductors for hybrid circuits
P = Low-frequency power transistors
Sm = Small-signal transistors

P = Low-frequency power transistors

P = Low-frequency power transistors

FET = Field-effect transistors
HVP = High-voltage power transistors
Mm = Microminiature semiconductors for hybrid circuits
P = Low-frequency power transistors
RFP = R.F. power transistors and modules
Sm = Small-signal transistors
WBT = Wideband hybrid IC transistors

* = series
FET = Field-effect transistors
Mm = Microminiature semiconductors for hybrid circuits
RFP = R.F. power transistors and modules
RT = Tripler
Sm = Small-signal transistors
ThM = Thyristor modules
WBM = Wideband hybrid IC modules
WBT = Wideband hybrid IC transistors

FET = Field-effect transistors
Mm = Microminiature semiconductors for hybrid circuits
PDT = Photodiodes or transistors
RFP = R.F. power transistors and modules
Sm = Small-signal transistors
Th = Thyristors

* = series
FET = Field-effect transistors
Mm = Microminiature semiconductors for hybrid circuits
Sm = Small-signal transistors
SP = Low-frequency switching power transistors
Th = Thyristors
Tri = Triacs

* = series
PM = Power MOS transistors
R = Rectifier diodes
SP = Low-frequency switching power transistors

* = series
D = Displays
Mm = Microminiature semiconductors for hybrid circuits
Ph = Photoconductive devices
PhC = Photocouplers
R = Rectifier diodes
TS = Transient suppressor diodes
Vrf = Voltage reference diodes
Vrg = Voltage regulator diodes

I = Infrared devices
LED = Light-emitting diodes
P = Low-frequency power transistors
Ph = Photoconductive devices
R = Rectifier diodes
Sm = Small-signal transistors
St = Rectifier stacks
Vrf = Voltage reference diodes
WBM = Wideband hybrid IC modules

INDEX

A = Accessories
FET = Field-effect transistors
I = Infrared devices
Ph = Photoconductive devices
R = Rectifier diodes
RFP = R.F. power transistors and modules
SD = Small-signal diodes
Sm = Small-signal transistors
WBT = Wideband hybrid IC transistors

A = Accessories.

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