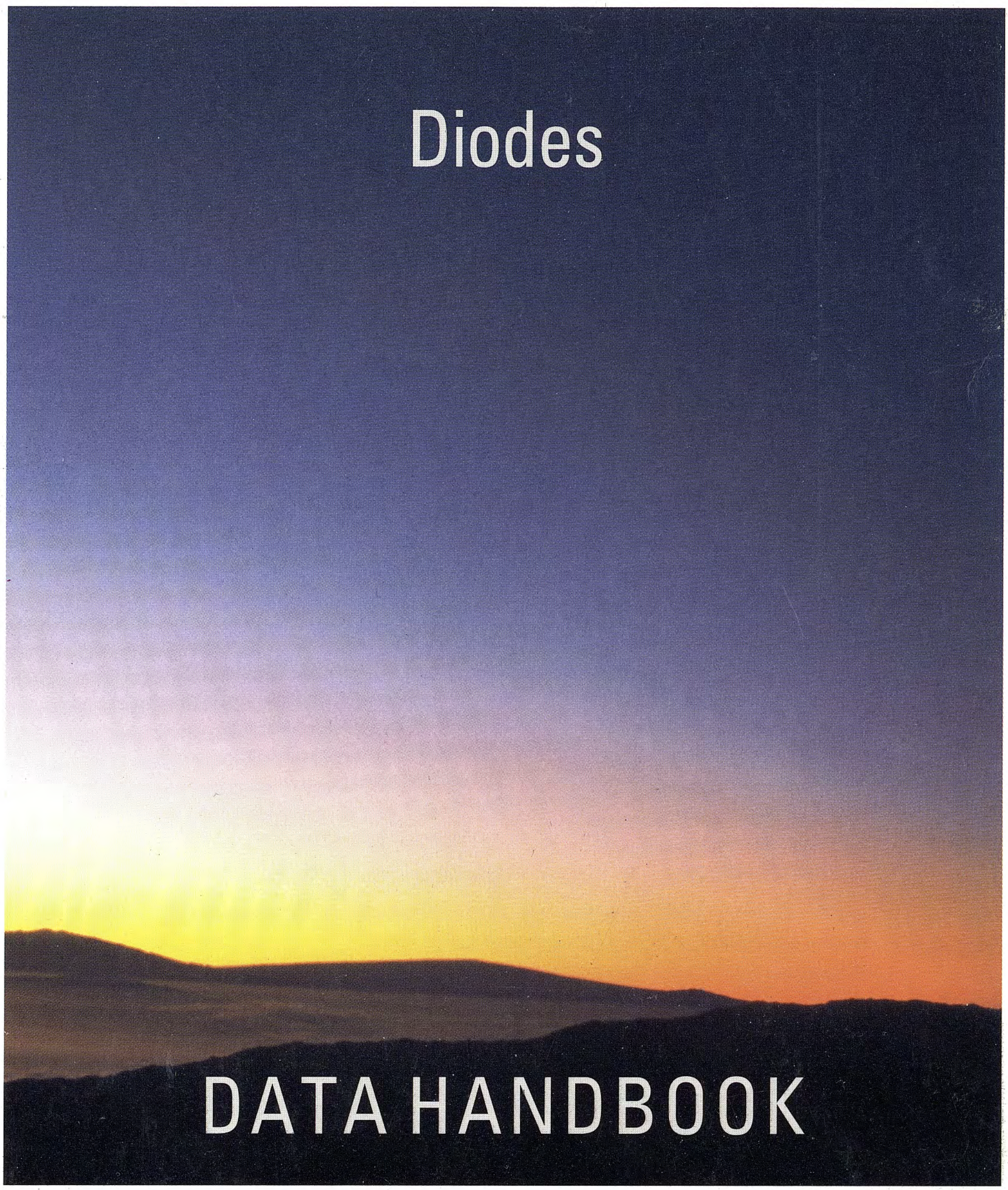
DISCRETE SEMICONDUCTORS



BOOK SC01 1992

Philips Semiconductors

PHILIPS

QUALITY ASSURED

Our quality system focuses on the continuing high quality of our components and the best possible service for our customers. We have a three-sided quality strategy: we apply a system of total quality control and assurance; we operate customer-oriented dynamic improvement programmes; and we promote a partnering relationship with our customers and suppliers.

PRODUCT SAFETY

In striving for state-of-the-art perfection, we continuously improve components and processes with respect to environmental demands. Our components offer no hazard to the environment in normal use when operated or stored within the limits specified in the data sheet.

Some components unavoidably contain substances that, if exposed by accident or misuse, are potentially hazardous to health. Users of these components are informed of the danger by warning notices in the data sheets supporting the components. Where necessary the warning notices also indicate safety precautions to be taken and disposal instructions to be followed. Obviously users of these components, in general the set-making industry, assume responsibility towards the consumer with respect to safety matters and environmental demands.

All used or obsolete components should be disposed of according to the regulations applying at the disposal location. Depending on the location, electronic components are considered to be 'chemical', 'special' or sometimes 'industrial' waste. Disposal as domestic waste is usually not permitted.

Diodes

Contents

SELECTION GUIDE

GENERAL PURPOSE AND HIGH-SPEED SWITCHING DIODES

All values quoted are maximum.

TYPE	CASE	RATINGS			CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)	
BA220	DO-35	10	200	400	4	2.5	0.95	100	73
BA221	DO-35	30	200	400	4	2.5	1.05	200	77
BA316	DO-35	10	100	225	4	2.0	1.10	100	95
BA317	DO-35	30	100	225	4	2.0	1.10	100	95
BA318	DO-35	50	100	225	4	2.0	1.10	100	95
BAL74	SOT23	50	250	250	6	2.0	1.25	150	119
BAL99	SOT23	70	250	250	6	1.5	1.00	50	123
BAS11	DO-35	300	350	2000	1000	20.0	1.10	300	129
BAS12	DO-35	400	350	2000	1000	20.0	1.10	300	129
BAS15	DO-34	50	100	225	4	2.0	1.10	100	137
BAS16	SOT23	75	250	500	6	2.0	1.25	150	141
BAS19	SOT23	100	200	625	50	5.0	1.25	200	149
BAS20	SOT23	150	200	625	50	5.0	1.25	200	149
BAS21	SOT23	200	200	625	50	5.0	1.25	200	149
BAS28	SOT143	75	215	500	6	2.0	1.00	50	157
BAS29	SOT23	90	250	600	50	35.0	1.25	400	161
BAS31 (note 1)	SOT23	90	250	600	50	35.0	1.25	400	161
BAS32L	SOD80C	75	200	450	4	2.0	1.00	100	163
BAS35 (note 1)	SOT23	90	250	600	50	35.0	1.25	400	161
BAS55	SOT23	60	250	600	6	2.5	1.00	200	179
BAS56 (note 1)	SOT143	60	200	600	6	2.5	1.00	200	187
BAV10	DO-35	60	300	600	6	2.5	1.25	500	247
BAS678	SOT23	80	250	600	6	2.0	1.00	200	205
BAV18	DO-35	50	250	625	50	5.0	1.25	200	255
BAV19	DO-35	100	250	625	50	5.0	1.25	200	255
BAV20	DO-35	150	250	625	50	5.0	1.25	200	255
BAV21	DO-35	200	250	625	50	5.0	1.25	200	255
BAV23 (note 1)	SOT143	200	200	625	50	5.0	1.25	200	263
BAV23S (note 1)	SOT23	200	200	625	50	5.0	1.25	200	265
BAV70 (note 1)	SOT23	70	215	450	6	1.5	1.25	150	275

TYPE	CASE	RATINGS			CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)	
BAV74 (note 1)	SOT23	50	250	250	4	2.0	1.00	100	279
BAV99 (note 1)	SOT23	70	215	450	6	1.5	1.25	150	283
BAV100	SOD80C	50	250	625	50	5.0	1.25	200	287
BAV101	SOD80C	100	250	625	50	5.0	1.25	200	287
BAV102	SOD80C	150	250	625	50	5.0	1.25	200	287
BAV103	SOD80C	200	250	625	50	5.0	1.25	200	287
BAV105	SOD80C	60	300	600	6	2.5	1.00	200	295
BAV10	SOD80C	60	300	600	6	2.5	1.00	200	247
BAW56 (note 1)	SOT23	70	215	450	6	2.0	1.25	150	303
BAW62	DO-35	75	200	450	4	2.0	1.00	100	307
BAX12	DO-35	90	400	800	50	35.0	1.25	400	315
BAX14	DO-35	20	500	2000	50	35.0	1.00	300	321
BAX18	DO-35	75	500	2000	–	35.0	1.00	300	327
BAY80	DO-35	120	250	625	50	6.0	1.00	100	333
PMBD914	SOT23	70	200	–	4	4.0	1.00	10	871
PMBD2835 (note 1)	SOT23	35	100	–	6	4.0	1.00	50	875
PMBD2836 (note 1)	SOT23	75	100	–	6	4.0	1.00	50	875
PMBD2837 (note 1)	SOT23	30	150	450	6	4.0	1.00	50	879
PMBD2838 (note 1)	SOT23	50	150	450	6	4.0	1.00	50	879
PMBD6050	SOT23	70	200	–	6	2.5	1.10	100	883
PMBD6100 (note 1)	SOT23	70	200	–	4	2.5	1.10	100	887
PMBD7000 (note 1)	SOT23	100	200	–	15	1.5	1.10	100	891
PMLL4148	SOD80C	75	200	450	4	4.0	1.00	10	899
PMLL4150	SOD80C	50	300	600	6	2.5	1.00	200	903
PMLL4151	SOD80C	50	200	450	4	2.0	1.00	50	903
PMLL4153	SOD80C	50	200	450	2	2.0	0.88	20	903
PMLL4446	SOD80C	75	200	450	4	4.0	1.00	20	899
PMLL4448	SOD80C	75	200	450	4	4.0	1.00	100	899
1N914	DO-35	75	75	225	4	4.0	1.00	10	929
1N916	DO-35	75	75	225	4	2.0	1.00	10	929

TYPE	CASE	RATINGS			CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	I_{FRM} (mA)	t_{rr} (ns)	C_d (pF)	V_F (V)	at I_F (mA)	
1N4148	DO-35	75	200	450	4	4.0	1.00	10	941
1N4150	DO-35	50	300	600	6	2.5	1.00	200	945
1N4151	DO-35	50	200	450	4	2.0	1.00	50	945
1N4153	DO-35	50	200	450	2	2.0	0.88	20	945
1N4446	DO-35	75	200	450	4	4.0	1.00	20	941
1N4448	DO-35	75	200	450	4	4.0	1.00	100	941
1N4531	DO-34	75	200	450	4	4.0	1.00	10	949
1N4532	DO-34	75	200	450	2	2.0	1.00	10	949

Note

1. Double diode.

TUNER DIODES

Variable capacitance diodes

TYPE	CASE	RATINGS		CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	C_d ratio (ratio)	at V_R (V/V)	
AFC								
BB119	DO-35	15	200	20 - 25	4.0	> 1.3	4/10	337
BB417	DO-34	20	20	8 - 11	4.0	2 - 5	4/15	377
FM radio								
BB204B (note 1)	TO-92	30	100	37 - 42	3.0	2.5 - 2.8	3/30	363
BB204G	TO-92	30	100	34 - 39	3.0	2.5 - 2.8	3/30	363
BB804 (note 1)	SOT23	18	50	42 - 47.5	2.0	1.7	2/8	385
AM radio								
BB112	SOD69	12	50	440 - 540	1.0	> 18	1/8.5	335
BB130	SOD69	30	50	450 - 550	1.0	> 23	1/28	341
BB212 (note 1)	TO-92	12	100	500 - 620	0.5	> 22.5	0.5/8	367
VHF television								
BB809	DO-34	28	20	39 - 46	1.0	8 - 10	1/28	387
BB909A	DO-34	32	20	> 31	1.0	12 - 15	1/28	397
BB909B	DO-34	32	20	> 33.5	1.0	12 - 15	1/28	397
BB910	DO-34	32	20	> 38	0.5	> 14	0.5/28	401
BB911	DO-34	32	20	> 63	0.5	> 21	0.5/28	403

TYPE	CASE	RATINGS		CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	C_d ratio (ratio)	at V_R (V/V)	
UHF television								
BB405B	DO-34	30	20	> 18	1.0	7.6	1/28	373
Varicaps for surface mounting								
VHF TELEVISION								
BB131	SOD323	30	20	0.7 - 1.055	28.0	12 - 16	0.5/28	343
BB132	SOD323	30	20	2.3 - 2.75	28.0	24 - 30	0.5/28	347
BB133	SOD323	30	20	2.2 - 2.6	28.0	14 - 21	0.5/28	351
BB619	SOD123	30	20	2.4 - 2.9	28.0	> 12.5	1/28	381
BB620	SOD123	30	20	2.9 - 3.4	28.0	19.5 - 25	1/28	383
BB901	SOT23	28	20	< 1.055	28.0	> 12	1/28	393
BBY40	SOT23	28	20	typ. 29	3.0	8 - 12	1/28	413
BBY42	SOT23	32	20	> 31	1.0	12 - 16	1/28	417
UHF TELEVISION								
BB134	SOD323	30	20	1.7 - 2.1	28.0	8.9 - 12	0.5/28	355
BB135	SOD323	30	20	1.7 - 2.1	28.0	8.9 - 12	0.5/28	359
BB215	SOD80	30	20	< 18	1.0	> 7.6	1/28	371
BB515	SOD123	30	20	1.85 - 2.25	28.0	8 - 9.6	1/28	379
BBY31	SOT23	28	20	typ. 17.5	1.0	typ. 9.7	1/28	405
BBY39 (note 1)	SOT23	30	20	typ. 17.5	1.0	> 8	1/28	411
BBY62 (note 1)	SOT143	28	20	typ. 17.5	1.0	typ. 9.7	1/28	419
SATELLITE TELEVISION								
BB811	SOD123	30	20	0.85 - 1.2	28.0	7.8 - 9.5	1/28	391

Note

1. Double diode.

Band switching diodes

TYPE	CASE	RATINGS		CHARACTERISTICS					PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	r_D (Ω)	at I_F (mA)	and f (MHz)	
BA223	DO-34	20	50	< 3.5	6	< 1.5	10	1	81
BA423	DO-34	20	50	< 2.5	3	< 1.2	10	1	103
BA423L	SOD80	20	50	< 2.5	3	< 1.2	10	1	105
VHF television									
BA482	DO-34	35	100	< 1.2	3	< 0.7	3	200	109
BA483	DO-34	35	100	< 1.0	3	< 1.2	3	200	109
BA484	DO-34	35	100	< 1.6	3	< 1.2	3	200	109
BA582	SOD123	35	100	< 1.1	3	< 0.7	3	200	113
BA682	SOD80	35	100	< 1.25	3	< 0.7	3	200	117
BA683	SOD80	35	100	< 1.2	3	< 1.2	3	200	117
BAT18	SOT23	35	100	< 1.0	20	< 0.7	5	200	217

UHF mixer Schottky barrier diode

TYPE	CASE	RATINGS		CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	V_F (mV)	at I_F (mA)	
BA481	DO-34	4	30	< 1.1	0	450	1	107

FM DETECTOR DIODE

TYPE	CASE	RATINGS		CHARACTERISTICS				PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	and f (MHz)	V_F at I_F = 10 μA (mV)	
BA281	DO-35	50	200	1.2	0	1	360 - 420	85

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	171
BAV45	TO-18	20	10	1.3	269
BAS45L	SOD80	125	1000	8	175

SCHOTTKY BARRIER SWITCHING DIODES

TYPE	CASE	RATINGS		CHARACTERISTICS					PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	t_{rr} (ns)	V_F (mV)	at I_F (mA)	
BAT17	SOT23	4	30	< 1	0	–	< 450	1	213
BAS81	SOD80C	40	30	1.6	1	–	410	1	191
BAT81	DO-34	40	30	< 1.6	1	1	< 410	1	231
BAS82	SOD80C	50	30	1.6	1	–	410	1	191
BAT82	DO-34	50	30	< 1.6	1	1	< 410	1	231
BAS83	SOD80C	60	30	1.6	1	–	410	1	191
BAT83	DO-34	60	30	< 1.6	1	1	< 410	1	231
BAS85	SOD80C	30	200	10	1	5	400	10	195
BAT54	SOT23	30	200	< 10	1	5	< 320	1	221
BAT54A;C;S (note 1)	SOT23	30	200	< 10	1	5	< 320	1	225
BAT74 (note 1)	SOT143	30	200	< 10	1	5	< 320	1	227
BAT85	DO-34	30	200	< 10	1	5	< 320	1	237
BAS86	SOD80C	50	200	< 8	1	4	< 450	10	201
BAT86	DO-34	50	200	< 8	1	4	< 380	1	243
BYV10-20	DO-41	20	1000	220	0	30	< 390	100	643
BYV10-30	DO-41	30	1000	220	0	30	< 390	100	643
BYV10-40	DO-41	40	1000	220	0	30	< 390	100	643

Note

1. Double diode.

VOLTAGE REGULATOR DIODES

Stabistors (used in forward direction).

TYPE	CASE	TYPICAL V_F at			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
		I_F = 1 mA (V)	I_F = 5 mA (V)	I_F = 10 mA (V)							
BA220	DO-35	0.59	0.67	0.71	10	400	–	–	–	–	73
BA314	DO-35	0.72	0.77	0.79	4	250	−1.8	1	6	10	87
BA315	DO-35	0.62	0.70	0.75	5	225	−2.1	1	7	10	91
BAS17	SOT23	0.70	0.77	0.79	4	250	−1.8	1	–	–	145
BAX14	DO-35	0.56	–	–	40	2000	–	–	–	–	321
BZV86	DO-35	–	1.4 2.0 2.6 3.2	–	10	250 250 150 150	−3.8 −6.0 −8.5 −11.5	5	20 30 32.5 35	5	799

TYPE	CASE	TYPICAL V_F at			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
		I_F = 1 mA (V)	I_F = 5 mA (V)	I_F = 10 mA (V)							
BZV87	SOD80	–	1.4	–	10	250	−3.8	5	20	5	803
			2.0			250	−6.0		30		
			2.6			150	−8.5		32.5		
			3.2			150	−11.5		35		

VOLTAGE REGULATORS (For high power regulators, see handbook SC02, Power Diodes)

TYPE	CASE	WORKING VOLTAGE		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
		E24 range (V)	tol. (%)					
BZV37	DO-34	6.5	5	–	0.4	(50)	40	757
BZX55 series	DO-35	2.4 to 75	5	250	0.5	(50)	40	827
BZX79 series	DO-35	2.4 to 75	1, 2, 3 or 5	250	0.5	50	40	831
BZX84 series	SOT23	2.4 to 75	5	250	0.3	(25)	–	847
BZV55 series	SOD80C	2.4 to 75	2, 3 or 5	250	0.4	(50)	40	771
BZV90	SOT223	2.4 to 75	5	400	1.3	(25)	40	807
PMLL5225B to PMLL5267B	SOD80C	3.0 to 75	5	250	0.5	(75)	10 (T_j = 55 °C); t = 8.3 ms	907
1N4728A to 1N4749A	DO-41	3.3 to 24	5	–	1	(50)	–	953
1N5225B to 1N5267B	DO-35	3.0 to 75	5	250	0.5	(75)	10 (T_j = 55 °C); t = 8.3 ms	965
BZV49 series	SOT89	2.4 to 75	5	250	1	(25)	40	761
BZV85 series	DO-41	3.6 to 75	5	250	1.3	55	60	787
BZD23 series	SOD81	3.6 to 270	5	–	2.5	25	300	727
BZD27 series	SOD87	3.6 to 270	5	–	2.3	105	300	737
BZT03 series	SOD57	7.5 to 270	5	–	3.25	25	600	747
BZW03 series	SOD64	7.5 to 270	5	–	6	25	1000	817
PMBZ5226B to PMBZ5257B	SOT23	3.3 to 33	5	250	0.3	(25)	–	895

LOW VOLTAGE AVALANCHE DIODES

TYPE	CASE	VOLTAGE RANGE	I_{FRM} (mA)	P_{tot} (W)	at T_{tp} (°C amb)	P_{ZSM} at T_j = 25 °C t_p = 100 µs (W)	PAGE
PLVA400A	DO-35	5.0 to 6.8	250	0.40	55	30	859
PLVA600A	SOT23	5.0 to 6.8	250	0.25	(25)	30	865

VOLTAGE REFERENCE DIODES

TYPE	CASE	REF. VOLTAGE AT I_Z				I_{ZM} (mA)	$\|S_Z\|$ (%/K)	at I_Z (mA)	r_{diff} at I_Z		PAGE
		MIN. (V)	NOM. (V)	MAX. (V)	(mA)				max. (Ω)	(mA)	
1N821;A	DO-34	5.89	6.2	6.51	7.5	50	<0.01	7.5	15 (10)	7.5	923
1N823;A							<0.005		(A-version)		923
1N825;A							<0.002				923
1N827;A							<0.001				923
1N829;A							<0.0005				923
BZV10	DO-34	5.9	6.2	6.5	2.0	50	<0.01	2.0	50	2.0	753
BZV11							<0.005				753
BZV12							<0.002				753
BZV13							<0.001				753
BZV14							<0.0005				753
BZV80	SOD80	5.89	6.2	6.51	7.5	50	<0.01	7.5	15	7.5	785
BZV81							<0.005				785

TRANSIENT SUPPRESSOR DIODES

TYPE	CASE	V_R (V)	$V_{(CL)R}$ (V)	I_{RSM} (A)	P_{RSM} (W)	PAGE
BZD23 series	SOD81	7.5 to 270	11.3 to 707	13.3 to 0.21	300	727
BZD27 series	SOD87	7.5 to 270	11.3 to 707	13.3 to 0.21	300	737
BZW14	SOD64	12	28	50	–	823
BZT03 series	SOD57	6.2 to 430	11.3 to 707	26.5 to 0.42	600	747
BZW03 series	SOD64	6.2 to 430	11.3 to 707	44.2 to 0.71	1000	817

RECTIFIER DIODES

General purpose diodes

TYPE	CASE	$I_{F(AV)}$ (A)	V_{RRM} (V)	I_{FSM} (A)	V_F (V)	at I_F (A)	PAGE
1N4001ID	SOD81	1.0	50	20	1.1	1.0	937
1N4002ID	SOD81	1.0	100	20	1.1	1.0	
1N4003ID	SOD81	1.0	200	20	1.1	1.0	
1N4004ID	SOD81	1.0	400	20	1.1	1.0	
1N4005ID	SOD81	1.0	600	20	1.1	1.0	
1N4006ID	SOD81	1.0	800	20	1.1	1.0	
1N4007ID	SOD81	1.0	1000	20	1.1	1.0	
1N4001G	SOD57	1.0	50	30	1.1	1.0	933
1N4002G	SOD57	1.0	100	30	1.1	1.0	
1N4003G	SOD57	1.0	200	30	1.1	1.0	
1N4004G	SOD57	1.0	400	30	1.1	1.0	
1N4005G	SOD57	1.0	600	30	1.1	1.0	
1N4006G	SOD57	1.0	800	30	1.1	1.0	
1N4007G	SOD57	1.0	1000	30	1.1	1.0	

Efficiency diodes

TYPE	CASE	I_{FWM} (A)	V_{RRM} (V)	I_{FRM} (A)	t_{tot} (μs)	V_F (V)	at I_F (A)	PAGE
BY228	SOD64	5	1500	10	20	1.5	5	425
BY328	SOD64	6	1400	10	13	1.45	5	429
BY428	SOD64	4	1400	8	6	1.95	4	435
BY438	SOD64	5	1200	10	20	1.5	5	439
BY448	SOD57	4	1500	8	20	1.6	3	443
BY458	SOD57	4	1200	8	20	1.6	3	443

Controlled avalanche diodes

TYPE	CASE	RATINGS				CHARACTERISTICS		PAGE
		$I_{F(AV)}$ (A)	V_{RWM} (V_{RRM}) (V)	V_R (V)	I_{FSM} (A)	V_F (V)	at I_F (A)	
BYD11D	SOD91	0.5	200	200	10	1.06	0.5	525
BYD11G	SOD91	0.5	400	400	10	1.06	0.5	
BYD11J	SOD91	0.5	600	600	10	1.06	0.5	
BYD11K	SOD91	0.5	800	800	10	1.06	0.5	
BYD11M	SOD91	0.5	1000	1000	10	1.06	0.5	
BYD13D	SOD81	1.4	200	200	20	1.05	1	529
BYD13G	SOD81	1.4	400	400	20	1.05	1	
BYD13J	SOD81	1.4	600	600	20	1.05	1	
BYD13K	SOD81	1.4	800	800	20	1.05	1	
BYD13M	SOD81	1.4	1000	1000	20	1.05	1	
PRLL4001	SOD87	1.6	50	50	20	1.1	1	911
PRLL4002	SOD87	1.6	100	100	20	1.1	1	911
BYD17D	SOD87	1.5	200	200	20	1.05	1	541
BYD17G	SOD87	1.5	400	400	20	1.05	1	
BYD17J	SOD87	1.5	600	600	20	1.05	1	
BYD17K	SOD87	1.5	800	800	20	1.05	1	
BYD17M	SOD87	1.5	1000	1000	20	1.05	1	
BY527	SOD57	2.0	(1250)	800	50	1.65	10	455
BYW54	SOD57	2.0	600	600	50	1.65	10	689
BYW55	SOD57	2.0	800	800	50	1.65	10	689
BYW56	SOD57	2.0	1000	1000	50	1.65	10	689
1N5059	SOD57	2.0	200	200	50	1.15	2.5	957
1N5060	SOD57	2.0	400	400	50	1.15	2.5	
1N5061	SOD57	2.0	600	600	50	1.15	2.5	
1N5062	SOD57	2.0	800	800	50	1.15	2.5	
BYM56A	SOD64	3.5	200	200	80	1.25	5	637
BYM56B	SOD64	3.5	400	400	80	1.25	5	
BYM56C	SOD64	3.5	600	600	80	1.25	5	
BYM56D	SOD64	3.5	800	800	80	1.25	5	
BYM56E	SOD64	3.5	1000	1000	80	1.25	5	

Avalanche fast soft-recovery diodes
All values quoted are maximum.

TYPE	CASE	RATINGS				CHARACTERSITICS			PAGE
		$I_{F(AV)}$ (A)	V_{RRM} (V)	V_R (V)	I_{FSM} (A)	t_{rr} (ns)	V_F (V)	at I_F (A)	
BYD31D	SOD91	0.44	200	200	5	250	1.35	0.5	549
BYD31G	SOD91	0.44	400	400	5	250	1.35	0.5	
BYD31J	SOD91	0.44	600	600	5	250	1.35	0.5	
BYD31K	SOD91	0.44	800	800	5	300	1.35	0.5	
BYD31M	SOD91	0.44	1000	1000	5	300	1.35	0.5	
BYD33D	SOD81	1.3	200	200	20	250	1.3	1	557
BYD33G	SOD81	1.3	400	400	20	250	1.3	1	
BYD33J	SOD81	1.3	600	600	20	250	1.3	1	
BYD33K	SOD81	1.3	800	800	20	300	1.3	1	
BYD33M	SOD81	1.3	1000	1000	20	300	1.3	1	
BYD43-20	SOD81	0.64	2000	–	10	300	2.4	1	581
BYD37D	SOD87	1.5	200	200	20	250	1.3	1	573
BYD37G	SOD87	1.5	400	400	20	250	1.3	1	
BYD37J	SOD87	1.5	600	600	20	250	1.3	1	
BYD37K	SOD87	1.5	800	800	20	300	1.3	1	
BYD37M	SOD87	1.5	1000	1000	20	300	1.3	1	
BYV95A	SOD57	1.5	200	200	35	250	1.6	3	673
BYV95B	SOD57	1.5	400	400	35	250	1.6	3	673
BYV95C	SOD57	1.5	600	600	35	250	1.6	3	673
BYV96D	SOD57	1.5	800	800	35	300	1.6	3	681
BYV96E	SOD57	1.5	1000	1000	35	300	1.6	3	681
BYW95A	SOD64	3.0	200	200	70	250	1.5	5	697
BYW95B	SOD64	3.0	400	400	70	250	1.5	5	697
BYW95C	SOD64	3.0	600	600	70	250	1.5	5	697
BYW96D	SOD64	3.0	800	800	70	300	1.5	5	705
BYW96E	SOD64	3.0	1000	1000	70	300	1.5	5	705

Very fast recovery diodes

TYPE	CASE	RATINGS				CHARACTERISTICS			PAGE
		$I_{F(AV)}$ (A)	V_{RRM} (V)	V_R (V)	I_{FSM} (A)	t_{rr} (ns)	V_F (V)	at I_F (A)	
BYV36A	SOD57	1.6	200	200	30	100	1.35	1	665
BYV36B	SOD57	1.6	400	400	30	100	1.35	1	
BYV36C	SOD57	1.6	600	600	30	100	1.35	1	
BYV36D	SOD57	1.5	800	800	30	150	1.45	1	
BYV36E	SOD57	1.5	1000	1000	30	150	1.45	1	
BYM36A	SOD64	3.0	200	200	45	100	1.6	3	629
BYM36B	SOD64	3.0	400	400	65	100	1.6	3	
BYM36C	SOD64	3.0	600	600	65	100	1.6	3	
BYM36D	SOD64	2.9	800	800	65	150	1.78	3	
BYM36E	SOD64	2.9	1000	1000	65	150	1.78	3	

Ultra fast recovery diodes

TYPE	CASE	RATINGS				CHARACTERISTICS			PAGE
		$I_{F(AV)}$ (A)	V_{RRM} (V)	V_R (V)	I_{FSM} (A)	t_{rr} (ns)	V_F (V)	at I_F (A)	
BYV26A	SOD57	1.0	200	200	30	30	2.5	1	645
BYV26B	SOD57	1.0	400	400	30	30	2.5	1	
BYV26C	SOD57	1.0	600	600	30	30	2.5	1	
BYV26D	SOD57	1.0	800	800	30	75	2.5	1	
BYV26E	SOD57	1.0	1000	1000	30	75	2.5	1	
BYM26A	SOD64	2.3	200	200	45	30	2.65	2	623
BYM26B	SOD64	2.3	400	400	45	30	2.65	2	
BYM26C	SOD64	2.3	600	600	45	30	2.65	2	
BYM26D	SOD64	2.3	800	800	45	75	2.65	2	
BYM26E	SOD64	2.3	1000	1000	45	75	2.65	2	

Ultra fast epitaxial avalanche diodes

TYPE	CASE	RATINGS				CHARACTERISTICS			PAGE
		$I_{F(AV)}$ (A)	V_{RRM} (V)	V_R (V)	I_{FSM} (A)	t_{rr} (ns)	V_F (V)	at I_F (A)	
BYD71A	SOD91	0.56	50	50	7	25	0.84	0.5	585
BYD71B	SOD91	0.56	100	100	7	25	0.84	0.5	
BYD71C	SOD91	0.56	150	150	7	25	0.84	0.5	
BYD71D	SOD91	0.56	200	200	7	25	0.84	0.5	
BYD71E	SOD91	0.54	250	250	7	50	0.90	0.5	
BYD71F	SOD91	0.54	300	300	7	50	0.90	0.5	
BYD71G	SOD91	0.54	400	400	7	50	0.90	0.5	
BYD73A	SOD81	1.75	50	50	25	25	0.95	1	595
BYD73B	SOD81	1.75	100	100	25	25	0.95	1	
BYD73C	SOD81	1.75	150	150	25	25	0.95	1	
BYD73D	SOD81	1.75	200	200	25	25	0.95	1	
BYD73E	SOD81	1.7	250	250	25	50	1.05	1	
BYD73F	SOD81	1.7	300	300	25	50	1.05	1	
BYD73G	SOD81	1.7	400	400	25	50	1.05	1	
BYD74A	SOD84	2.4	50	50	50	25	0.94	2	605
BYD74B	SOD84	2.4	100	100	50	25	0.94	2	
BYD74C	SOD84	2.4	150	150	50	25	0.94	2	
BYD74D	SOD84	2.4	200	200	50	25	0.94	2	
BYD74E	SOD84	2.15	250	250	50	50	1.05	2	
BYD74F	SOD84	2.15	300	300	50	50	1.05	2	
BYD74G	SOD84	2.15	400	400	50	50	1.05	2	
BYD77A	SOD87	2.0	50	50	25	25	0.95	1	613
BYD77B	SOD87	2.0	100	100	25	25	0.95	1	
BYD77C	SOD87	2.0	150	150	25	25	0.95	1	
BYD77D	SOD87	2.0	200	200	25	25	0.95	1	
BYD77E	SOD87	1.85	250	250	25	50	1.05	1	
BYD77F	SOD87	1.85	300	300	25	50	1.05	1	
BYD77G	SOD87	1.85	400	400	25	50	1.05	1	
BYV27-50	SOD57	2.0	50	50	50	25	1.07	3	651
BYV27-100	SOD57	2.0	100	100	50	25	1.07	3	
BYV27-150	SOD57	2.0	150	150	50	25	1.07	3	
BYV27-200	SOD57	2.0	200	200	50	25	1.07	3	
BYV28-50	SOD64	3.5	50	50	90	30	1.1	5	659
BYV28-100	SOD64	3.5	100	100	90	30	1.1	5	
BYV28-150	SOD64	3.5	150	150	90	30	1.1	5	
BYV28-200	SOD64	3.5	200	200	90	30	1.1	5	

Schottky rectifier diodes

TYPE	CASE	RATINGS		CHARACTERISTICS					PAGE
		V_R (V)	I_F (mA)	C_d (pF)	at V_R (V)	t_{rr} (ns)	V_F (mV)	at I_F (mA)	
PRLL5817	SOD87	20	1000	70	4	–	< 320	100	915
PRLL5818	SOD87	30	1000	50	4	–	< 330	100	915
PRLL5819	SOD87	40	1000	50	4	–	< 340	100	915
1N5817	SOD81	20	1000	80	4	–	< 320	100	969
1N5818	SOD81	30	1000	50	4	–	< 330	100	
1N5819	SOD81	40	1000	50	4	–	< 340	100	
1N5820ID	SOD84A	20	3000	250	4	–	< 390	1000	979
1N5821ID	SOD84A	30	3000	175	4	–	< 525	3000	
1N5822ID	SOD84A	40	3000	175	4	–	< 950	9400	

E.H.T. soft recovery TV stacks

All values quoted are maximum.

TYPE	CASE	$I_{F(AV)}$ (mA)	V_{RRM} (kV)	V_{RW} (V_{RWM}) (kV)	t_{rr} (µs)	PAGE
BY584	SOD61	85	1.8	1.5	0.2	463
BY505	SOD61	85	2.2	2.0	0.2	451
BY705	SOD61	20	5	4	0.2	493
BY706	SOD61	20	6	5	0.2	493
BY707	SOD61	4	10	9	0.2	497
BY708	SOD61	4	12	10	0.2	497
BY709	SOD61	4	14	12	0.2	497
BY710	SOD61	3	17	14	0.2	501
BY711	SOD61	3	19	16	0.2	501
BY712	SOD61	3	22	18	0.2	505
BY713	SOD61	3	24	20	0.2	505
BY714	SOD61	3	30	24	0.2	505
BY715	SOD61	20	5	4	0.1	509
BY716	SOD61	20	6	5	0.1	509
BY717	SOD61	4	10	9	0.1	513
BY718	SOD61	4	12	10	0.1	513
BY719	SOD61	4	14	12	0.1	513
BY720	SOD61	3	17	14	0.1	517
BY721	SOD61	3	19	16	0.1	517
BY722	SOD61	3	22	18	0.1	521
BY723	SOD61	3	24	20	0.1	521
BY724	SOD61	3	30	24	0.1	521

E.H.T. soft recovery avalanche TV stacks

All values quoted are maximum.

TYPE	CASE	$I_{F(AV)}$ (mA)	V_{RRM} (kV)	V_{RW} (V_{RWM}) (kV)	t_{rr} (µs)	PAGE
BY609	SOD61	4	12	12	0.2	469
BY610	SOD61	4	12	12	0.2	469
BY617	SOD61	4	9	7.5	0.1	477
BY619	SOD61	4	12	12	0.1	483
BY620	SOD61	4	12	12	0.1	483

E.H.T. soft recovery diodes for miscellaneous applications

TYPE	CASE	$I_{F(AV)}$ (mA)	V_{RRM} (kV)	V_{RW} (kV)	t_{rr} (µs)	APPLICATION	PAGE
BY614	SOD61	50	2.2	2.0	0.3	night viewer and other applications	473
BYX90G	SOD83	550	7.5	(6)	0.35	general industrial applications	713
BYX110GP	SOD101	350	9	(8)	–	microwave ovens	719
BYX120G	SOD88A	100	3.0	3.0	5.0	automotive ignition systems	723

TYPE NUMBER SURVEY

Diodes

Type number survey

TYPE NUMBER	DESCRIPTION	PAGE
BA220	general purpose	73
BA221	general purpose	77
BA223	band switch	81
BA281	FM detector	85
BA314	stabistor	87
BA315	stabistor	91
BA316	general purpose	95
BA317	general purpose	95
BA318	general purpose	95
BA423	band switching AM	103
BA423L	band switching SM	105
BA481	Schottky barrier	107
BA482	band switch	109
BA483	band switch	109
BA484	band switch	109
BA582	band switch	113
BA682	band switch	117
BA683	band switch	117
BAL74	general purpose	119
BAL99	general purpose	123
BAS11	general purpose	129
BAS12	general purpose	129
BAS15	general purpose	137
BAS16	high speed	141
BAS17	stabistor	145
BAS19	general purpose	149
BAS20	general purpose	149
BAS21	general purpose	149
BAS28	general purpose	157
BAS29	general purpose	161
BAS31	general purpose	161
BAS32L	high speed SM	163
BAS35	general purpose	161
BAS45	low leakage	171
BAS45L	low leakage SM	175
BAS55	general purpose	179
BAS56	general purpose	187
BAS81	Schottky barrier	191
BAS82	Schottky barrier	191
BAS83	Schottky barrier	191

TYPE NUMBER	DESCRIPTION	PAGE
BAS85	Schottky barrier	195
BAS86	Schottky barrier	201
BAS678	general purpose	205
BAT17	Schottky barrier	213
BAT18	band switch	217
BAT54	Schottky barrier	221
BAT54A	Schottky barrier	225
BAT54C	Schottky barrier	225
BAT54S	Schottky barrier	225
BAT74	Schottky barrier	227
BAT81	Schottky barrier	231
BAT82	Schottky barrier	231
BAT83	Schottky barrier	231
BAT85	Schottky barrier	237
BAT86	Schottky barrier	243
BAV10	general purpose	247
BAV18	general purpose	255
BAV19	general purpose	255
BAV20	general purpose	255
BAV21	general purpose	255
BAV23	general purpose	263
BAV23S	general purpose	265
BAV45	low leakage	269
BAV70	high speed	275
BAV74	high speed	279
BAV99	high speed	283
BAV100	general purpose	287
BAV101	general purpose	287
BAV102	general purpose	287
BAV103	general purpose	287
BAV105	ultra high speed	295
BAW56	general purpose	303
BAW62	general purpose	307
BAX12	general purpose	315
BAX14	stabistor	321
BAX18	general purpose	327
BAY80	general purpose	333
BB112	tuner	335
BB119	tuner	337
BB130	tuner	341

GENERAL

Pro electron type designation code
for semiconductor devices

Rating systems

Letter symbols

Quality conformance and reliability

General explanatory notes

Colour codes

Packing

Mounting and soldering

Envelopes

Soldering recommendations

Thermal characteristics

Thermal model

EHT stacks

Pro electron type designation code for semiconductor devices

Basic type number

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

A basic type number consists of two letters followed by a serial number.

FIRST LETTER

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

- **A** germanium or other material with band gap of 0.6 to 1.0 eV
- **B** silicon or other material with band gap 1.0 to 1.3 eV
- **C** gallium-arsenide or other material with band gap 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 (see note 1). The same letter could be used for multi-chip devices with similar elements.

A	diode	:	signal, low power (see note 2)
B	diode	:	variable capacitance
C	transistor	:	low power, audio frequency
D	transistor	:	power, audio frequency
E	diode	:	tunnel
F	transistor	:	low power, high frequency
G	multiple of dissimilar devices; miscellaneous devices	:	(see note 3)
H	diode	:	magnetic sensitive
L	transistor	:	power, high frequency
N	photo coupler	:	
P	radiation detector	:	high sensitive phototransistor, solar-cell (see note 3)
Q	radiation generator	:	light-emitting diode LED; laser (see note 3)
R	control or switching device	:	low power (see note 3); e.g. thyristors, diacs, triacs, unijunction transistors UJT, programmable unijunction transistors PUT, silicon bidirectional switch SBS, opto-triacs, etc.
S	transistor	:	low power switching
T	control or switching device	:	power (see note 3); e.g. thyristors, triacs
U	transistor	:	power switching
W	surface acoustic wave device	:	
X	diode	:	multiplier; e.g. varactor, step recovery
Y	diode	:	rectifying, booster
Z	diode	:	voltage reference or regulator, transient voltage suppressor diode (see note 3)

SERIAL NUMBER

Three figures, running from 100 to 999, for devices primarily intended for consumer equipment (see note 4). One letter (Z, Y, X etc.) and two figures, running from 10 to 99, for devices primarily intended for industrial/ professional equipment (see note 4). This letter has no fixed meaning, with the following exceptions:

- **A** : for triacs after second letter 'R' or 'T'
- **F** : for emitters and receivers in fibre-optic communication after second letter 'G', 'P' or 'Q' (see note 5)
- **L** : for lasers in non-fibre-optic applications, after second letter 'G' or 'Q' (see note 5)
- **O** : for opto-triacs after second letter 'R'
- **T** : for 3-state bicolour LEDs after second letter 'Q'
- **W** : for transient voltage suppressor diodes after second letter 'Z'

EXAMPLES OF BASIC TYPE NUMBERS

AA112 : germanium, low-power signal diode (consumer type)
ACY32 : germanium,, low-power AF transistor (industrial type)
BD232 : silicon, power AF transistor (consumer type)
CQY17 : GaAs, light-emitting diode (industrial type)
RPY84 : CdS, photo-conductive cell (industrial type)

Version letter(s)

One or two letters may be added to the basic type number to indicate a minor variant of the basic type either electrically or mechanically. The letters never have a fixed meaning, except:

letter 'R' indicating reverse polarity
letter 'W' for surface mounted devices (SMD).

Suffix

Sub-classification can be used for devices supplied in a wide range of variants called associated types.

The following sub-coding suffixes are in use:

VOLTAGE REFERENCE AND VOLTAGE REGULATOR DIODES

One letter and one number, preceded by a hyphen (-). The letter, if required, indicates the nominal tolerance of the zener 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)

In the event of a 3% nominal tolerance the letter 'F' will be used.

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.

Example : BZY74-C6V3 or -C10.

TRANSIENT VOLTAGE SUPPRESSOR DIODES

One number, precede by a hyphen (-). The number indicates the maximum recommended continuous reversed (stand-off) voltage V_R. The letter 'V' is used instead of a decimal point.

Example : BZW70-9V1 or -39.

The letter 'B' may be used immediately after the last number to indicate bidirectional suppressor diodes.

Example : BZW10-15B.

CONVENTIONAL AND CONTROLLED AVALANCHE RECTIFIER DIODES AND THYRISTORS

One number, preceded by a hyphen (-). 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 with respect to the case is indicated by letter 'R', immediately after the number.

Example : BYT-100 or -100R.

RADIATION DETECTORS

One number, preceded by a hyphen (-). The number indicates the depletion layer in µm. The resolution is indicated by a version letter.

Example : BPX10-2A.

ARRAY OF RADIATION DETECTORS AND GENERATORS

One number preceded by a hyphen. The number indicates how many basic devices are assembled into the array.

Example : BPW50-6, BPW50-9, BPW50-12.

RADIATION GENERATORS

One number, preceded by a hyphen (-). The number indicates the luminance intensity range in milli-candela (mcd).

Example : CQY54-1.

HIGH FREQUENCY POWER TRANSISTORS

One number, preceded by a hyphen (-). The number indicates the supply voltage.

Example : BLU80-24.

SEMICONDUCTOR POWER DEVICES

Under consideration.

Colour codes for small signal diodes

PREFIX METHOD 1 2 broad bands		METHOD II Body colour	SERIAL NUMBER VERSION LETTER (if any) METHOD I: narrow band METHOD II: one broad band followed by narrow band(s)	
AA - brown	Z - white		0 - black	
BA - red	Y - grey	BAY - grey	1 - brown	A - brown
	X - black	BAX - black	2 - red	B - red
	W - blue	BAW - blue	3 - orange	C - orange
	V - green	BAV - green	4 - yellow	D - yellow
	T - yellow	BAT - yellow	5 - green	E - green
	S - orange	BAS - orange	6 - blue	F - blue
			7 - violet	G - violet
			8 - grey	H - grey
			9 - white	I - white

The cathode side is indicated by the broad band(s).

Notes

1. Low-power type = $R_{th\ j\text{-}c} > 15$ K/W.
   Power type = $R_{th\ j\text{-}c} < 15$ K/W.
2. See Pro Electron colour for small signal diodes.
3. With special third letter (see 'serial number' section).
4. When the supply of these serial numbers is exhausted, the serial number may be expanded to three figures (industrial types) and four figures (consumer types).
5. In the case of second letter 'G', the first letter should be defined in accordance with the material of the main optical device.

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 RECTIFIER DIODES, THYRISTORS, TRIACS AND BREAKOVER DIODES

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 letters shall be used.

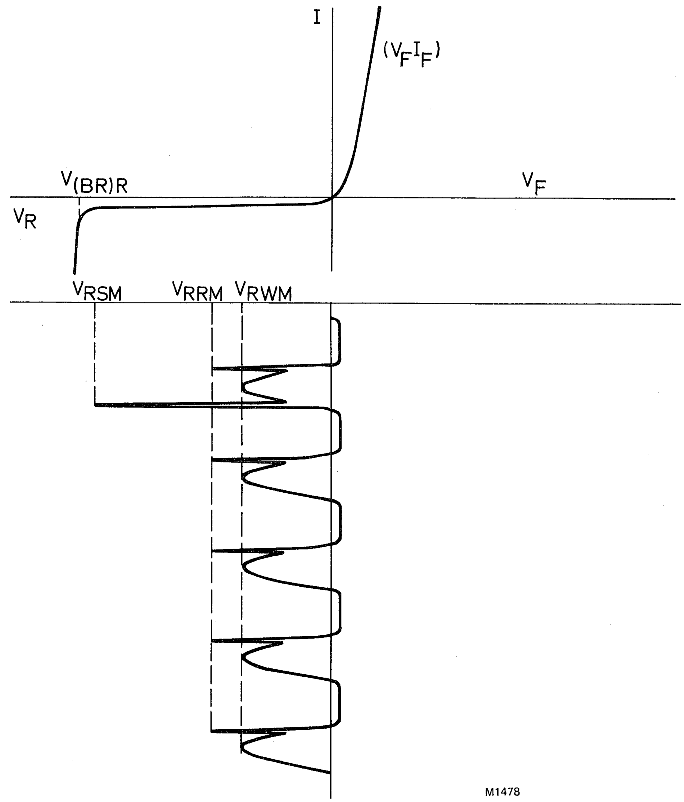
Subscripts

amb	Ambient
(AV), (av)	Average value
(BO)	Breakover
(BR)	Breakdown
case	Case
C	Controllable
D,d	Forward off-state [1]), non-triggered (gate voltage or current)
F,f	Forward [1]), fall
G,g	Gate terminal
H	Holding
I,i	Input
J,j	Junction
L	Latching
M,m	Peak or crest value
min	Minimum
O,o	Output, open circuit
(OV)	Overload
P,p	Pulse
Q,q	Turn-off
R,r	As first subscript: reverse, rise As second subscript: repetitive, recovery
(RMS), (rms)	R.M.S. value
S,s	As first subscript: storage, stray, series, source, switching As second subscript: non-repetitive
stg	Storage
T,t	Forward on-state [1]), triggered (gate voltage or current)
th	Thermal
(TO)	Threshold
tot	Total
W	Working
Z	Reference or regulator (i.e. zener)

For power rectifier diodes, thyristors and triacs, the terminals are **not** indicated in the subscript, except for the gate-terminal of thyristors and triacs.

1) For the anode-cathode voltage of thyristors and triacs, F is replaced either by D or T, to distinguish between 'off-state' (non-triggered) and 'on-state' (triggered).

Example of the use of letter symbols



Simplified rectifier characteristic together with an anode-cathode voltage as a function of time.

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 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}

QUALITY CONFORMANCE AND RELIABILITY

In addition to 100% testing of all major device parameters in the production department, independently controlled statistical sampling for conformance and reliability takes place using BS6001 'Sampling Procedures and Tables'. BS6001 is consistent with MIL–STD–105D. DEF131A, IS02859, CA–C–115.

The market demand for a continuously improving product quality is being met by the annual updating of formal quality improvement plans.

The 'Defect free' and 'Right first time' concepts are applied regularly as part of an overall quality programme covering all aspects of device quality from initital design to final production. These concepts, together with the quality assurance requirements, embrace all the principles outlined in DEF STAN 05–21, AQAP–1, and BS5750 Pt1.

CONFORMANCE

The Company actively promote a policy of customer cooperation to determine their quality problems and future requirements. This cooperation is often in the form of a 'ppm' activity. The 'ppm' is a measure of conformance of the outgoing product, and is expressed as the number of reject devices found per million of products delivered (e.g. a process average of 0,01% = 100 ppm). Mutually agreed ppm targets are set, and a programme of quality improvement work initiated.

In addition to the above, special inspection and/or test procedures are available, following consultation with the customer and the agreement of a special specification.

RELIABILITY

'Screening', or 'Burn-in' procedures are also available, based on the requirements of CECC 50 000.

CECC 50 000 offers a choice of four screening sequences: 'A', 'B', 'C', 'D'. The Company's standard 'Hi-rel' procedure offers a combination of 'C' and 'D' sequences.

Sequence 'C'

1. High temperature storage — 24 hours minimum.
2. Rapid change of temperature — as detailed in agreed specification.
3. Sealing — fine leak test.
   — gross leak test.
4. Functional electrical characteristics — within group 'A' limits.

Sequence 'D'

1. 'Burn-in' — high-voltage reverse bias, 48 hours duration. Conditions as specified in CECC 50 000.
2. Post 'Burn-in' measurements — functional electrical characteristics, within group 'A' limits.

Other 'Hi-rel', 'Burn-in', or Screening' procedures may be available on request.

RECTIFIER DIODES

REVERSE RECOVERY

When a semiconductor rectifier diode has been conducting in the forward direction sufficiently long to establish the steady state, there will be a charge due to minority carriers present. Before the device can block in the reverse direction this charge must be extracted. This extraction takes the form of a transient reverse current and this, together with the reverse bias voltage results in additional power dissipation which reduces the rectification efficiency. At sine-wave frequencies up to about 400 Hz these effects can often be ignored, but at higher frequencies and for square waves the switching losses must be considered.

Stored charge

The area under the I_R- time curve is known as the stored charge (Q_s) and is normally quoted in micro- or nanocoulombs. Low stored charge devices are preferred for fast switching applications.

Reverse recovery time

Another parameter which can be used to determine the speed of the rectifier is the reverse recovery time (t_{rr}). This is measured from the instant the current passes through zero (from forward to reverse) to the instant the current recovers to 10% of its peak reverse value. Low reverse recovery times are associated with low stored charge devices.

The conditions which need to be specified are:
a. Steady-state forward current (I_F); high currents increase recovery time.
b. Reverse bias voltage (V_R); low reverse voltage increases recovery time.
c. Rate of fall of anode current (dI_F/dt); high rates of fall reduce recovery time, but increase stored charge.
d. Junction temperature (T_j); high temperatures increase both recovery time and stored charge.

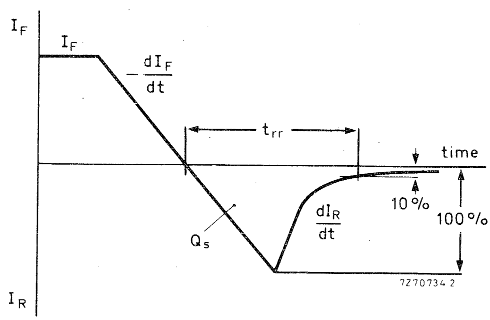


Fig. 1 Waveform showing the reverse recovery aspects.

REVERSE RECOVERY

Softness of recovery

In many switching circuits it is not just the magnitude but the shape of the reverse recovery characteristic that is important. If the positive-going edge of the characteristic has a fast rise time (as in a so-called 'snap-off' device) this edge may cause conducted or radiated r.f.i., or it may generate high voltages across inductors which may be in series with the rectifier. The maximum slope of the reverse recovery current (dI_R/dt) is quoted as a measure of the 'softness' of the characteristic. Low values are less liable to give r.f.i. problems. The measurement conditions which need to be specified are as above. When stored charges are very low, e.g. for epitaxial and Schottky-barrier rectifier diodes,this softness characteristic can be ignored.

DOUBLE-DIFFUSED RECTIFIER DIODES

A single-diffused diode with a two layer p-n structure cannot combine a high forward current density with a high reverse blocking voltage.

A way out of this dilemma is provided by the three layer double-diffused structure. A lightly doped silicon layer, called the base, is sandwiched between highly doped diffused p^+ and n^+ outer layers giving a $p^+ - pn^+$ or $p^+ - nn^+$ layer. Generally, the base gives the diode its high reverse voltage, and the two diffused regions give the high forward current rating.

Although double-diffused diodes are highly efficient, a slight compromise is still necessary. Generally, for a given silicon chip area, the thicker the base layer the higher the V_R and the lower the I_F. Reverse switching characteristics also determine the base design. Fast recovery diodes usually have n-type base regions to give 'soft' recovery. Other diodes have the base type, n or p, chosen to meet their specific requirements.

ULTRA FAST RECTIFIER DIODES

Ultra fast rectifier diodes, made by epitaxial technology, are intended for use in applications where low conduction and switching losses are of paramount importance and relatively low reverse voltage (V_{RRM} = 400 V) is required: e.g., switched-mode power supplies operating at frequencies of about 50 kHz.

The use of epitaxial technology means that there is very close control over the almost ideal diffusion profile and base width giving very high carrier injection efficiencies leading to lower conduction losses than conventional technology permits. The well defined diffusion profile also allows a tight control of stored minority carriers in the base region, so that very fast turn-off times can be achieved. The range of devices also has a soft reverse recovery and a low forward recovery voltage.

SWITCHING LOSSES (see also Fig.3)

The product of transient reverse current and reverse bias voltage is a power dissipation, most of which occurs during the fall time. In repetitive operation an average power can be calculated. This is then added to the forward dissipation to give the total power. The peak value of transient reverse current is known as I_{RRM}.

The conditions which need to be specified are:

a. Forward current (I_F); high currents increase switching losses.
b. Rate of fall of anode current (dI_F/dt); high rates of fall increase switching losses. This is particularly important in square-wave operation. Power losses in sine-wave operation for a given frequency are considerably less due to the much lower dI_F/dt.
c. Frequency (f); high frequency means high losses.
d. Reverse bias voltage (V_R); high reverse bias means high losses.
e. Junction temperature (T_j); high temperature means high losses.

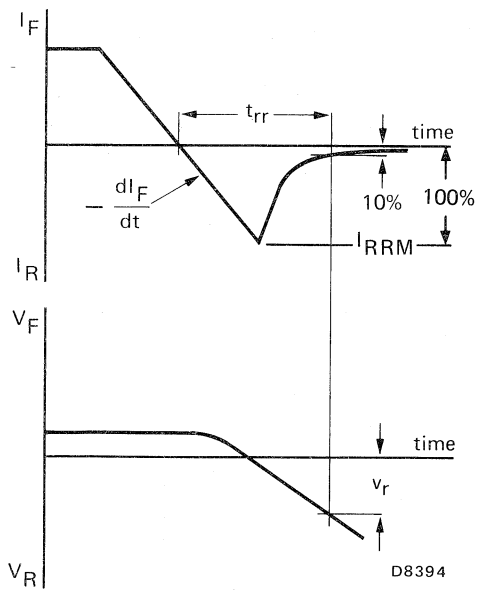


Fig.2 Waveforms showing the reverse switching losses aspects.

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, SOT-143 and SOT-89 encapsulations can be delivered in reel packing for aotomatic 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.

A separate reel packing for SOT-89 encapsulation is given in Fig. 4.

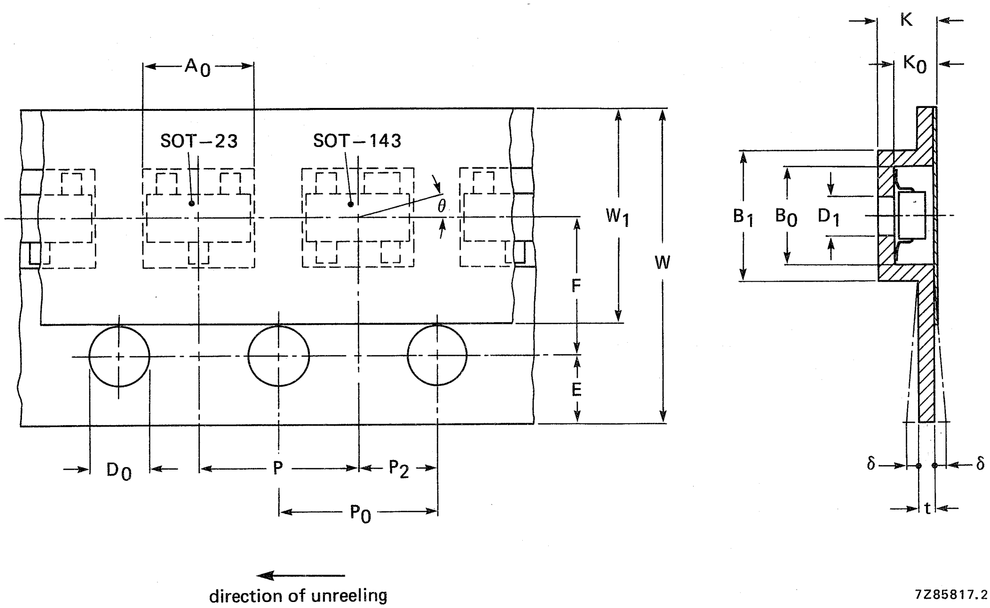


Fig. 1 Configuration of bandolier. Dimensions in mm.

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^o	max.
hole diameter	D_1	1	min.
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.

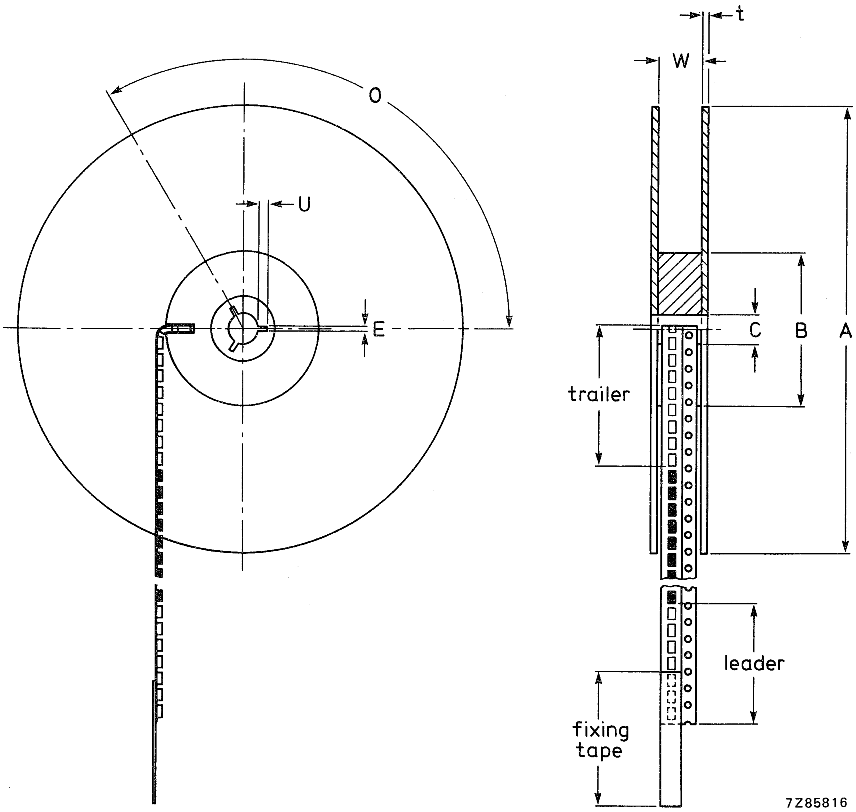


Fig. 2 Configuration of reel and flange (dimensions in mm).

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 3000 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.

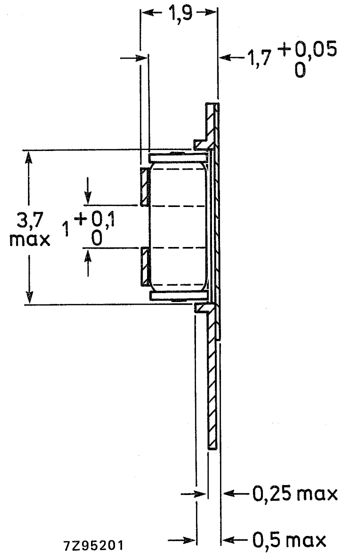


Fig. 3 Cross-sectional view of bandolier with SOD-80 devices.

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

HANDBOOK S1 PACKING

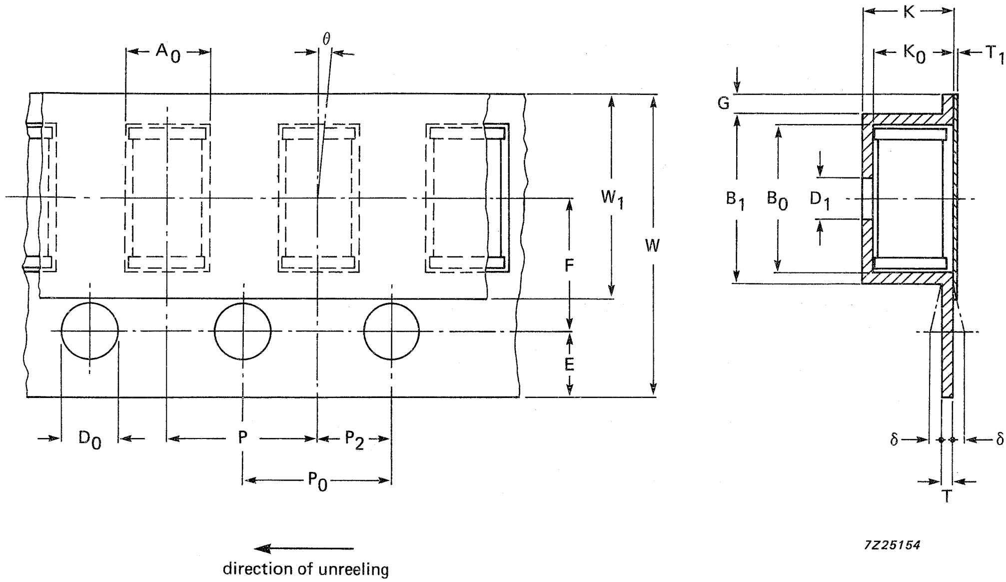


Fig. 4 Cross-sectional view of bandolier with SOD-87 devices.

Note: Testing of SOD-87 devices is not possible in this tape. Total number of devices per reel is 2000.

Compartment			tolerance
length	A_0	2.1	+0.3
width	B_0	3.8	min.
depth	K_0	2.1	+0.3
width outside	B_1	4.5	max.
pitch	P	4.0	± 0.1
deviation	θ	± 5°	max.
hole diameter	D_1	1.0	+0.1
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			tolerance
length direction	P_2	2.0	± 0.05
width direction	F	3.5	± 0.1
Fixing tape			
width	W_1	5.5	max.
thickness	T_1	0.1	max
Carrier tape			
width	W	8	± 0.2
bending	δ	0.3	max.
thickness	T	0.4	max.
Overall thickness	K	2.5	max.

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

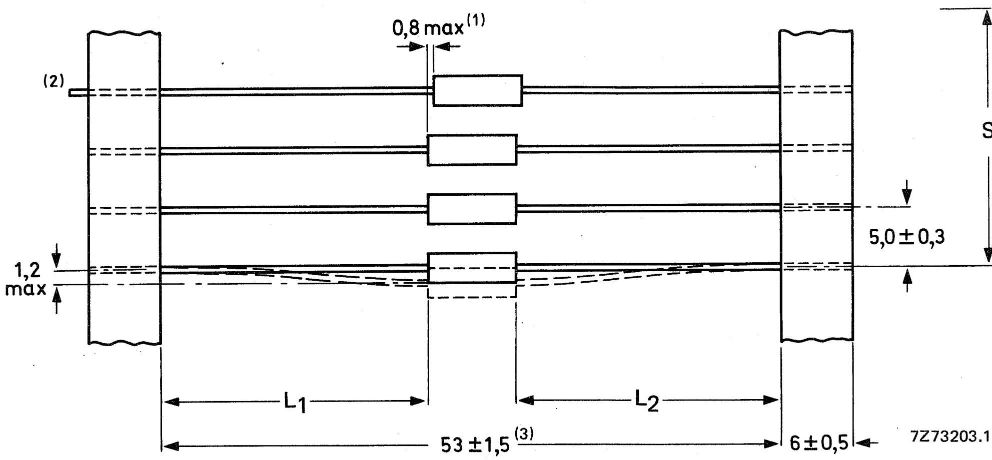


Fig. 1 Configuration of bandolier.

The red tape indicates the diode cathode side.

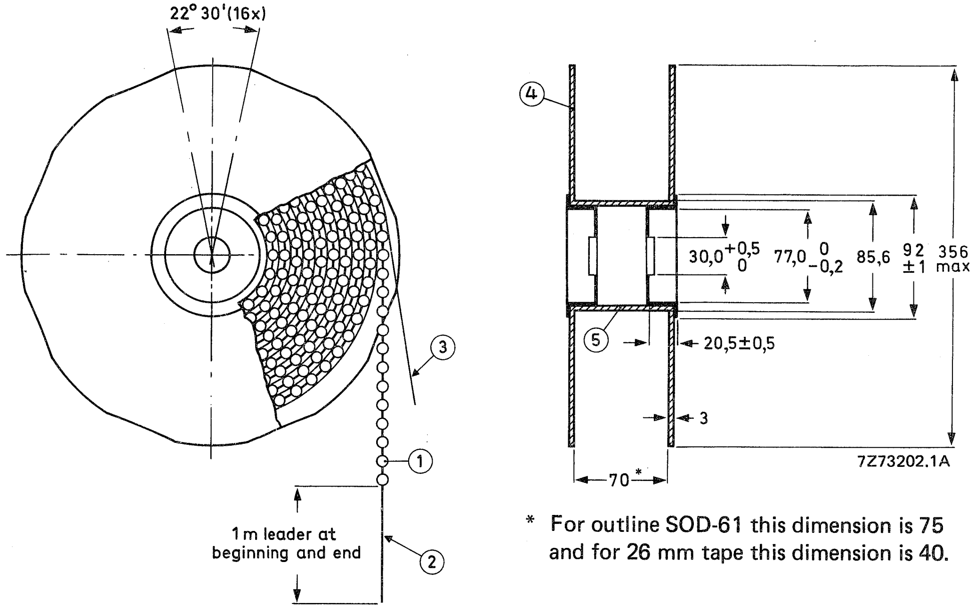
1. Displacement between any two diodes; for DO-34 maximum 0,4.
2. No protruding ends of lead except for BZX75 series maximum 1,2.
3. For outline SOD-61 this dimension is 58 ± 2 and for 26 mm tape this dimension is $26^{+1,5}_{-0}$.

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

The diodes are centred so that $| L_1 - L_2 | \leqslant 1{,}2$ 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
SOD-81	–	5 000
SOD-84	–	5 000
SOD-91	–	10 000

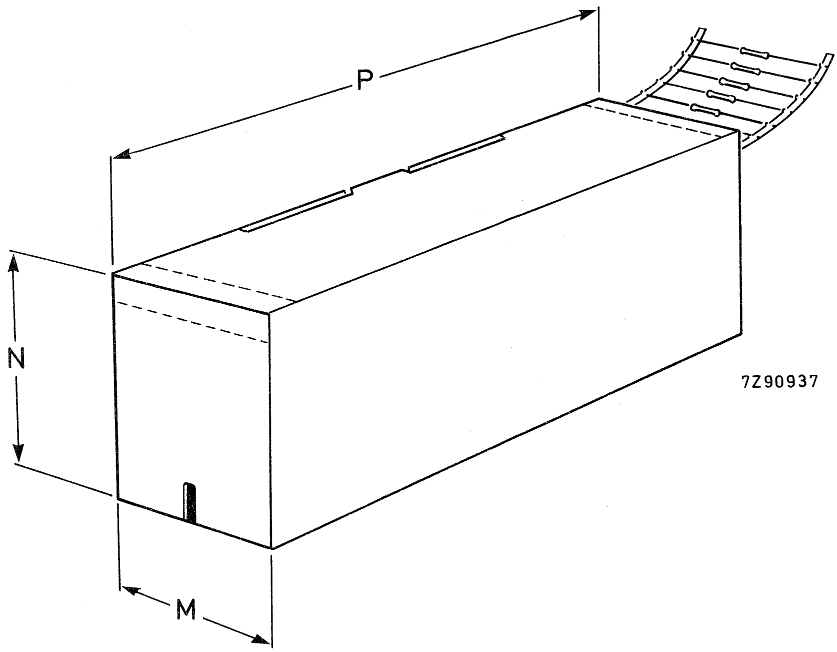


Fig. 3.

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

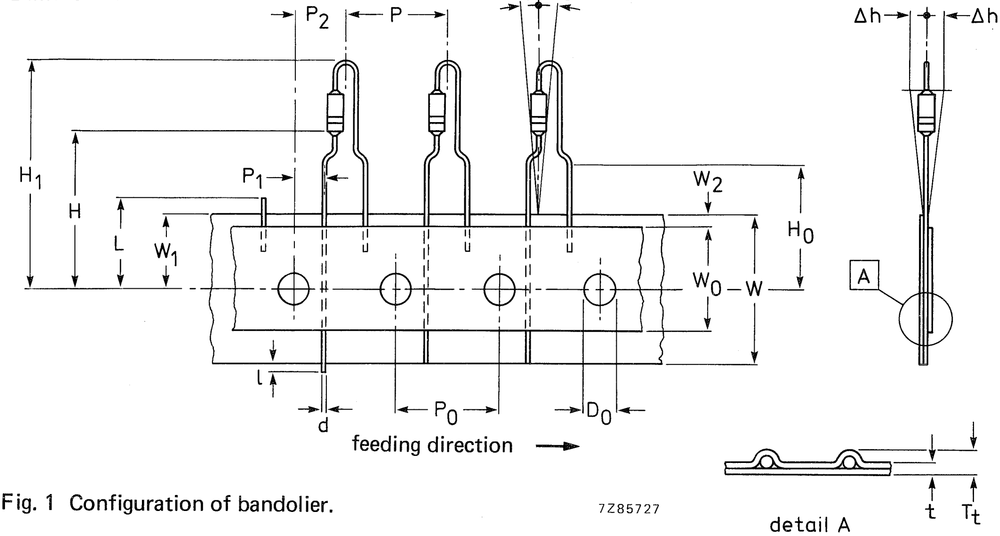


Fig. 1 Configuration of bandolier.

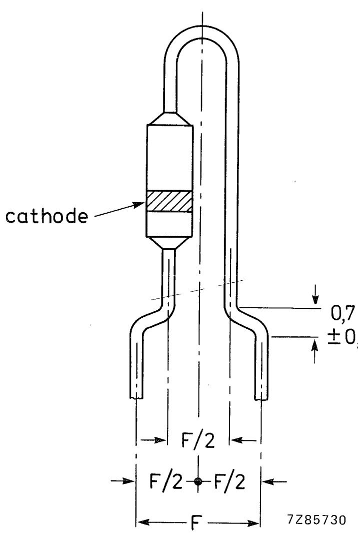


Fig. 2 Detail configuration of component shape.

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.

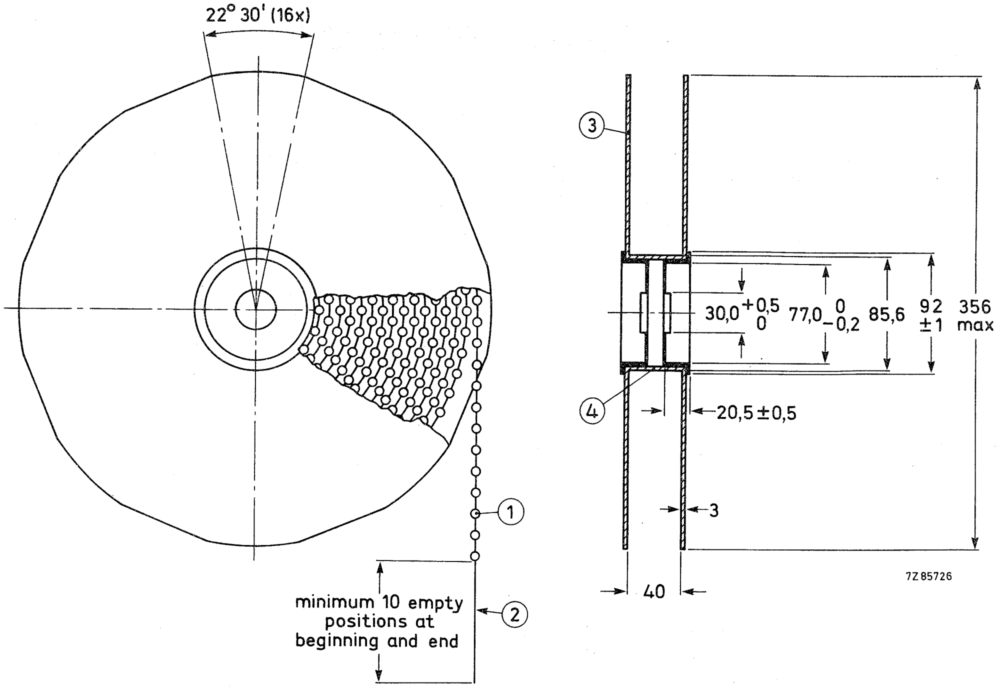


Fig. 3 Reel dimensions (mm) for radial-taped diodes.

(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.

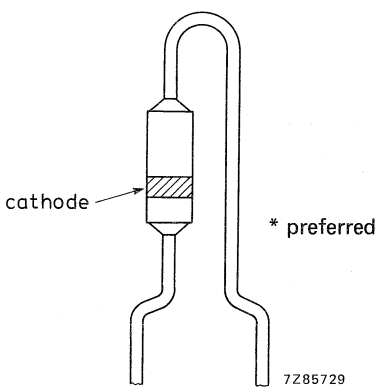


Fig. 4 + leading*.

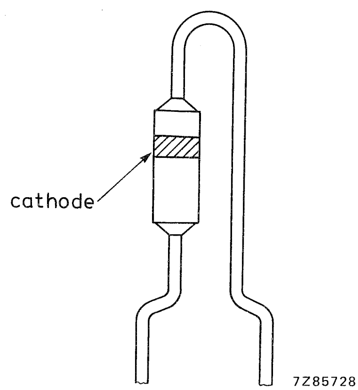


Fig. 5 — leading.

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° 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°.

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-ciruit 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
SOD-84	–	glass	3	0,5	5	0,5
SOD-91	–	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.

SOD-64 ENVELOPES WITH PREFORMED LEADS

Some types of automatic insertion machines have problems bending the (relatively thick) leads of SOD-64 glass bead diodes. Therefore we have available the most popular SOD-64 types with preformed leads. They are supplied in bulk, in quantities of 1000 pieces.

The following types are available; (/20 indicates preformed leads):

Type	12NC
BYW95C/20	9336 215 90112
BYW96E/20	9336 765 50112
BY228/20	9336 215 80112
BYV28-150/20	9336 300 90112
BYV28-200/20	9336 104 40112

MECHANICAL DATA

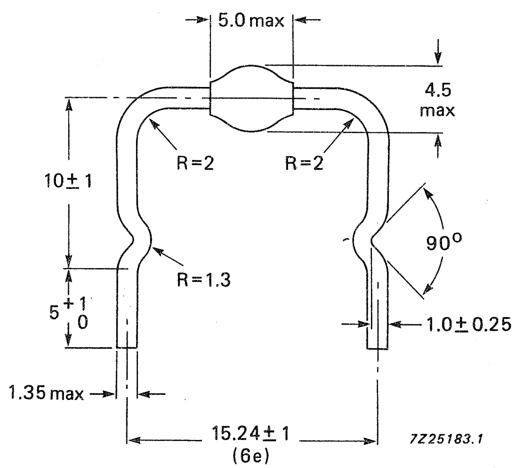


Fig. 9 SOD-64/20 with preformed leads.

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 ^{o}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 ^{o}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.

WAVE SOLDERING

The normal (dual) wave soldering process can also be aplied to SOT-23 and SOT-143 envelopes
We do not recommend SOT-89 for wave soldering.

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.

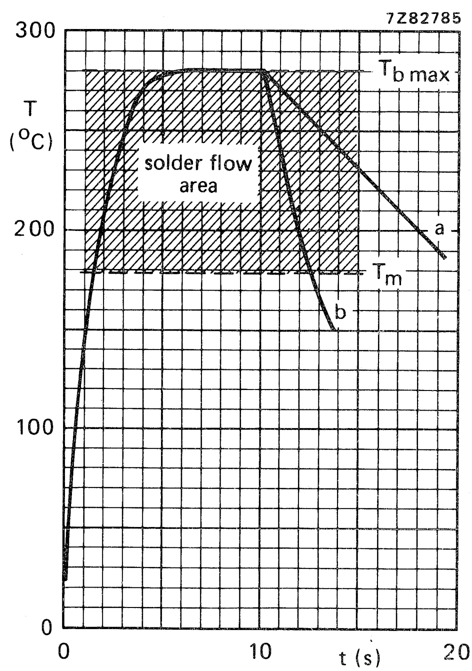


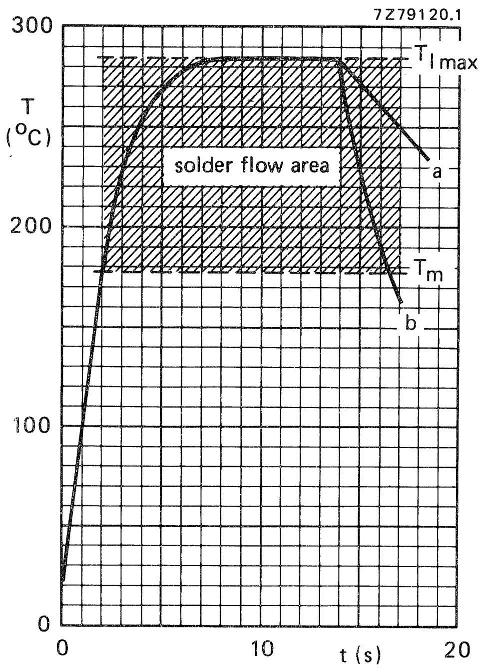
Fig. 1 Device temperature during *immersion* soldering.

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.

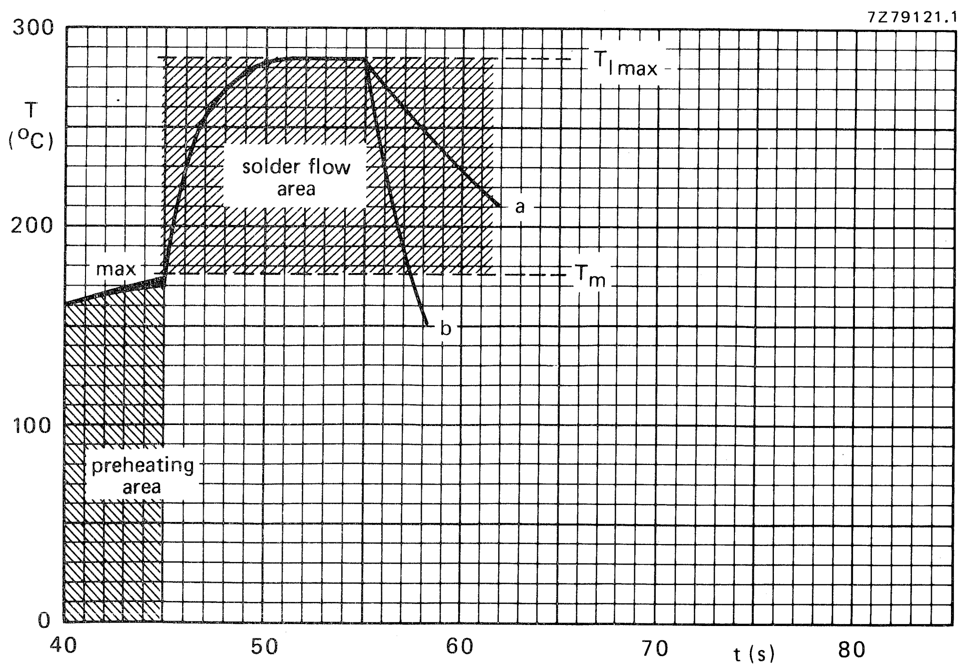


Fig. 3 Reflow soldering with preheating.

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

Dimensions in mm

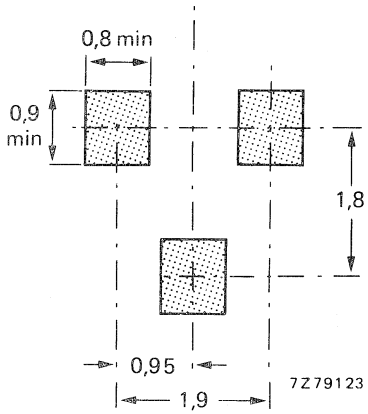


Fig. 4 SOT-23 pattern.

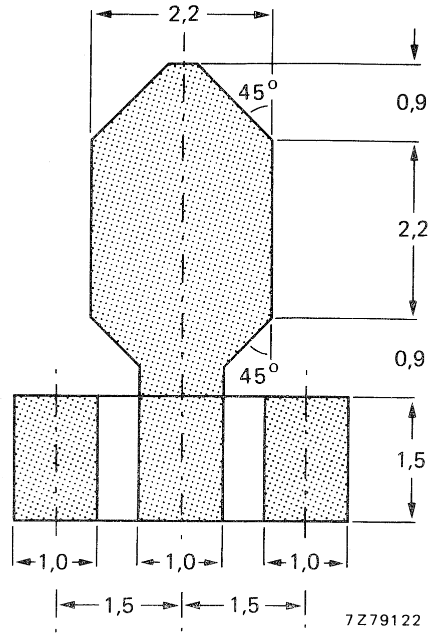


Fig. 5 SOT-89 pattern.

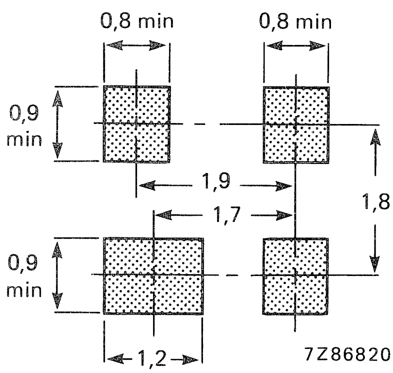


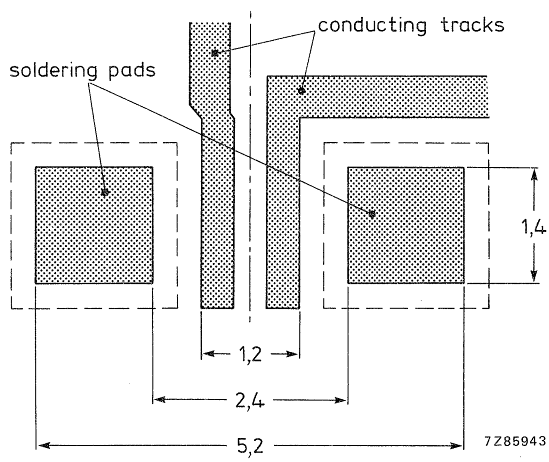
Fig. 6 SOT-143 pattern.

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



SOLDERING RECOMMENDATIONS
SOD-87 ENVELOPE

The layout shown below is intended for use with mounting of diodes having a SOD-87 envelope onto a printed-circuit board in those cases where the diode is glued to the printed-circuit 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.

Dimensions in mm

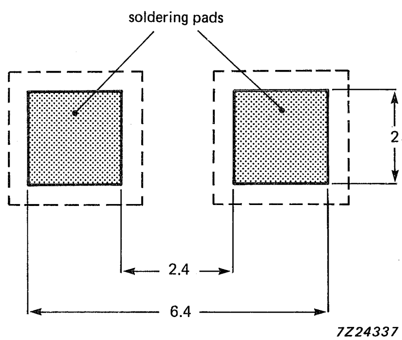


Fig. 2.

For more details refer to Handbook S7 "Soldering recommendations".

THERMAL CHARACTERISTICS
FOR SOT-23 AND SOT-143 ENVELOPES

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

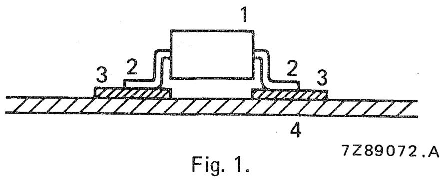


Fig. 1.

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).

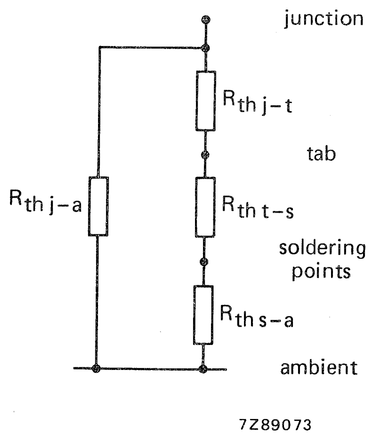


Fig. 2 Thermal behaviour of heat flow when the device is mounted on a substrate or printed circuit board.

$R_{th\ j\text{-}t}$ = 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.

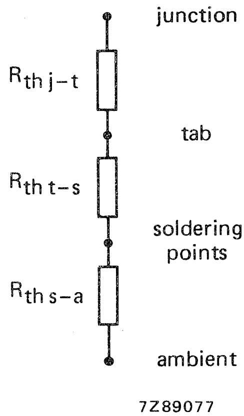


Fig. 3 Basic thermal model.

Heat transfer from junction to tab

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

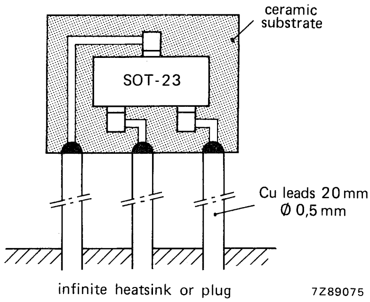
for high-frequency transistors, low-power diodes and (MOS) FETs	60 K/W
for low-frequency and switching transistors	50 K/W
for low-frequency medium-power transistors	30 K/W

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.



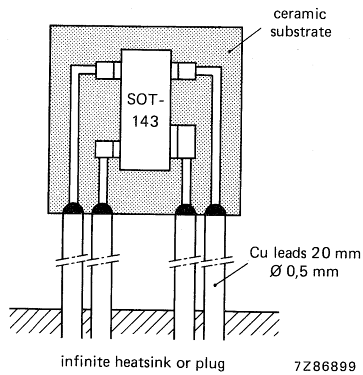


Fig. 4 Test circuits SOT-23 and SOT-143 mounting conditions on a ceramic substrate.

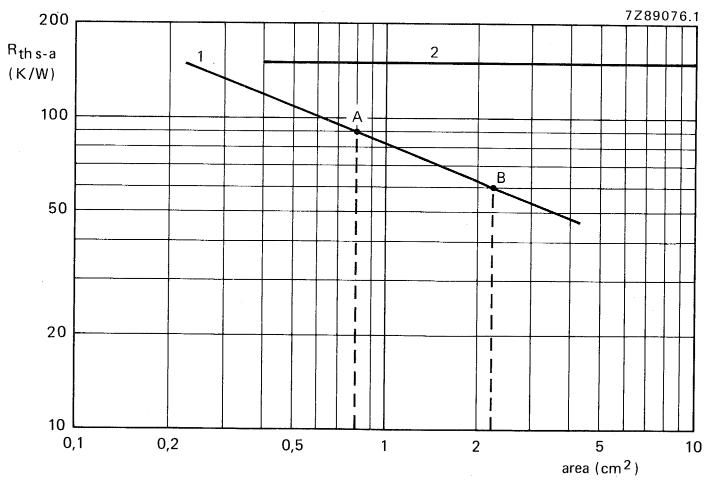


Fig. 5 Heat transfer from soldering points to ambient.

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 given earlier and in Fig. 5.
The formula for devices in SOT-23 with one crystal can be generalized:

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

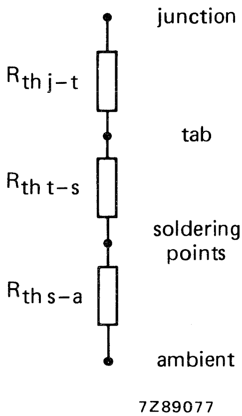


Fig. 6 Thermal model of SOT-23 envelopes with one crystal.

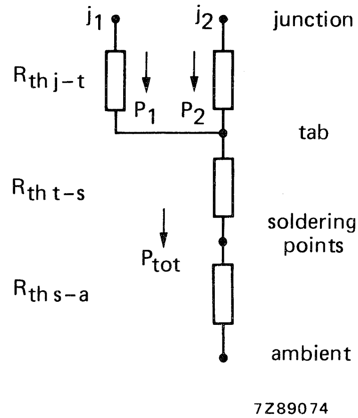


Fig. 7 Thermal model of SOT-23 envelopes with two crystals (double diode).

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 with Fig. 3:

$R_{th\ j\text{-}t}$ 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.

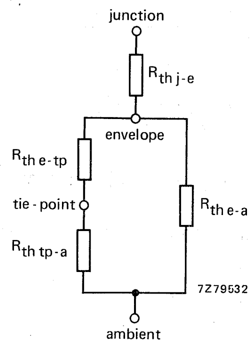


Fig. 1 Thermal resistance model.

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-84	SOD-57	SOD-64	note
$R_{th\,j\text{-}e}$ junction-envelope		32	22	18	12	
$R_{th\,e\text{-}tp}$ envelope-tie-point	lead length (mm)					
	5	15	15	15	7	
	10	30	30	30	14	
	15	45	45	45	21	
	20	60	60	60	28	
	25	75	75	75	35	
$R_{th\,e\text{-}a}$ envelope-ambient	length length (mm)					
	5	600	440	580	410	
	10	450	350	445	300	
	15	370	300	350	230	
	20	310	265	290	185	
	25	265	240	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	70	1. mounted as in Fig. 2
		55	55	55	55	2. mounted with Cu laminate per lead of 1 cm^2
		45	45	45	45	3. mounted with Cu laminate per lead of 2,25 cm^2

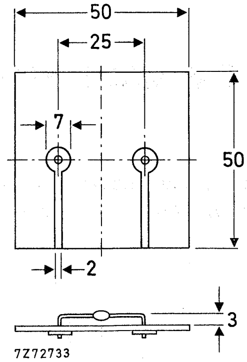


Fig. 2 Mounted on a printed-circuit board.

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

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

	SOD-81	SOD-84	SOD-57	SOD-64	Note
$R_{th\ j\text{-}a}$	120 K/W	105 K/W	100 K/W	75 K/W	Mounted on 1,5 mm thick epoxy-glass p.c. board with copper thickness $\geqslant 40\ \mu m$; Fig. 2.
$R_{th\ j\text{-}tp}$	60 K/W	50 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.

CUSTOM MADE EHT STACKS

Based on our experience gained with high voltage stacks in the professional market we are offering a wide range of custom-made EHT stacks for industrial, military and aerospace applications;
e.g.

- X-ray equipment
- E-beam microscopes
- Automobile ignition systems
- Conventional (50 Hz) microwave ovens
- SMPS-microwave ovens
- Ion implanters
- Radar equipment
- Bar-code readers

All stacks are in a glass-bead envelope offering the following features;

- Hermetic sealing
- Glass passivation for excellent stability
- High-temperature metallurgical bonds
- Low leakage currents enabling junction temperatures up to 175 ^oC
- Well-matched coefficients of expansion of component materials
- Possibility of guaranteed controlled avalanche properties

Encapsulation of the glass-bead stack in plastic, to increase the isolation distance, is also possible.

Some examples of custom made stacks:

OF746: V_{RWM}max. 5 kV; $t_{rr} < 30$ ns; $I_{F(AV)}$max. 0.18 A at T_{oil} = 70 ^oC (SOD-83A)
OF824: V_{RWM}max. 2.5 kV; $t_{rr} < 350$ ns; $I_{F(AV)}$max. 1.1 A at T_{oil} = 45 ^oC (SOD-83A)
OF867: V_{RWM}max. 12 kV; $t_{rr} < 350$ ns; $I_{F(AV)}$max. 0.225 A at T_{oil} = 45 ^oC (SOD-83B)

QUICK REFERENCE DATA (type dependent)

Crest working reverse voltage	V_{RWM}	max.	2 to 20	kV
Average forward current	$I_{F(AV)}$	max.	up to 1.5	A
Reverse recovery time	t_{rr}	max.	30, 75, 150	ns
			350 and 5000	ns
Junction temperature	T_j	max.	175	^oC

MECHANICAL DATA (see next page)

MECHANICAL DATA

Dimensions in mm

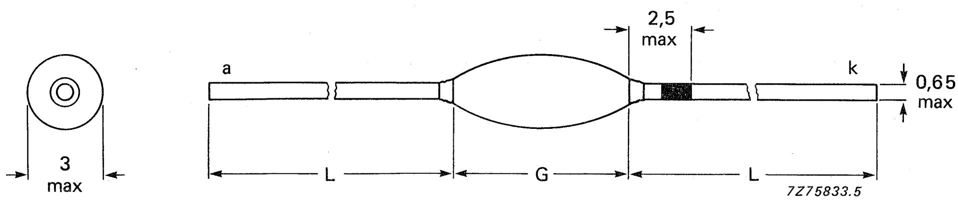


Fig. 1 **SOD-61** G = 11,5 max.; L = 29,5 min.

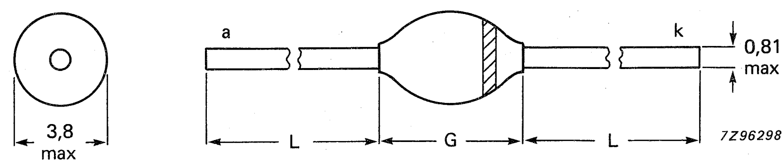


Fig. 2 **SOD-88** G = 8 max.; L = 26 min. (A-version).
G = 11 max.; L = 24,5 min. (B-version).

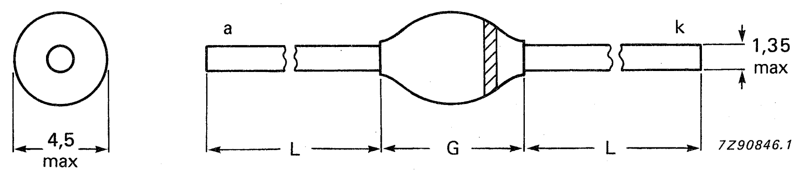


Fig. 3 **SOD-83** G = 7,5 max.; L = 26,5 min. (A-version).
G = 11 max.; L = 24,5 min. (B-version).

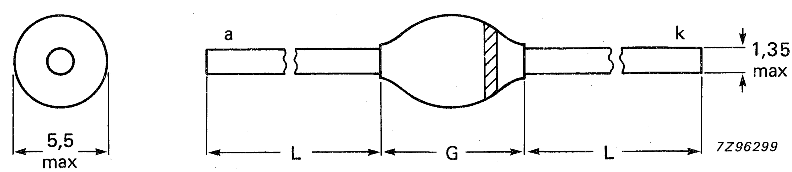


Fig. 4 **SOD-89** G = 7 max.; L = 26,5 min. (A-version).
G = 10 max.; L = 25 min. (B-version).

AVERAGE CURRENT VERSUS WORKING REVERSE VOLTAGE AT VARIOUS REVERSE RECOVERY TIME PARAMETERS

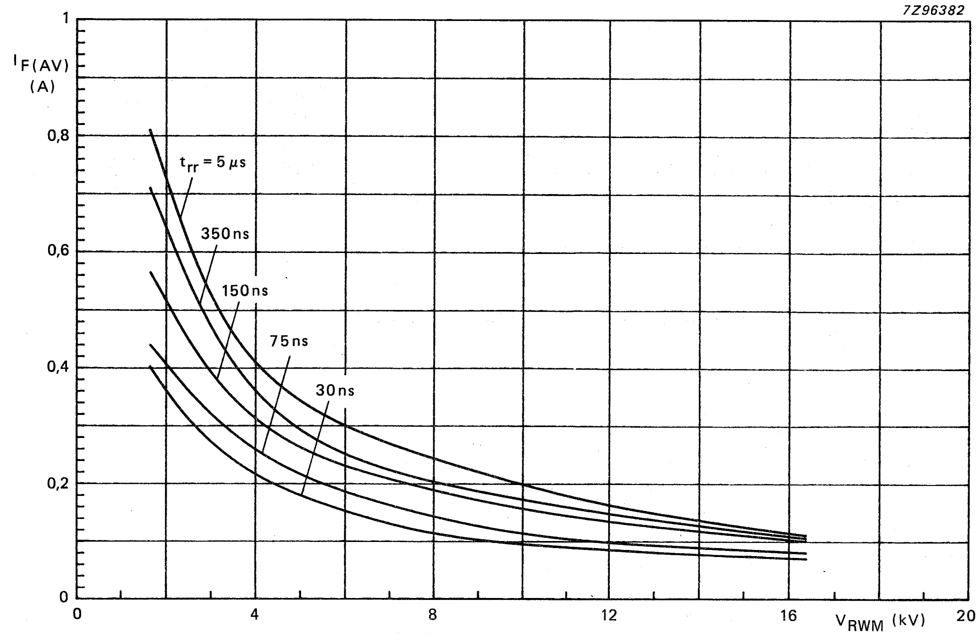


Fig. 5 **SOD-61** $R_{th\ j\text{-}oil}$ = 35 K/W; P_{RSM} = 200 W/kV at 10 μs; T_{oil} = 45 °C; duty cycle for V_{RWM} = 0,5; leakage dissipation included.

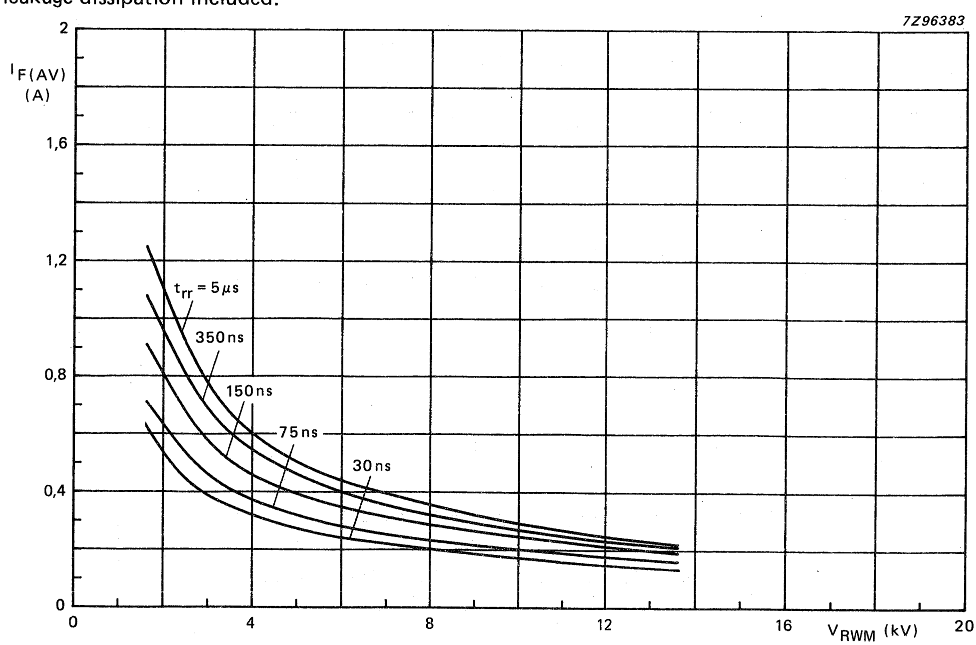


Fig. 6 **SOD-88** $R_{th\ j\text{-}oil}$ = 25 K/W; P_{RSM} = 400 W/kV at 10 μs; T_{oil} = 45 °C; duty cycle for V_{RWM} = 0,5; leakage dissipation included.

AVERAGE CURRENT VERSUS WORKING REVERSE VOLTAGE AT VARIOUS REVERSE RECOVERY TIME PARAMETERS

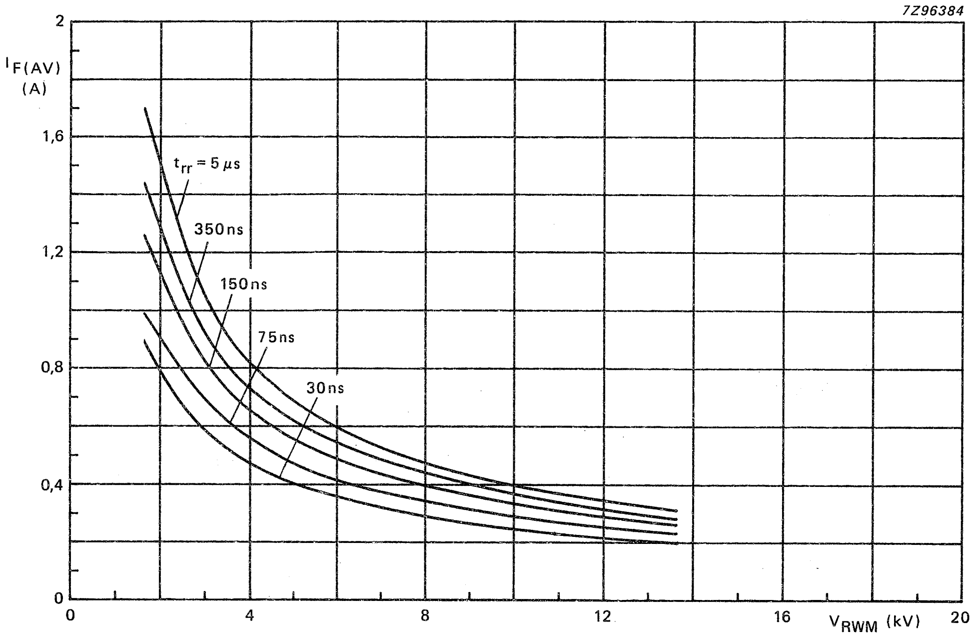


Fig. 7 **SOD-83** $R_{th\ j\text{-}oil}$ = 20K/W; P_{RSM} = 800 W/kV at 10 μs; T_{oil} = 45 °C; duty cycle for V_{RWM} = 0,5; leakage dissipation included.

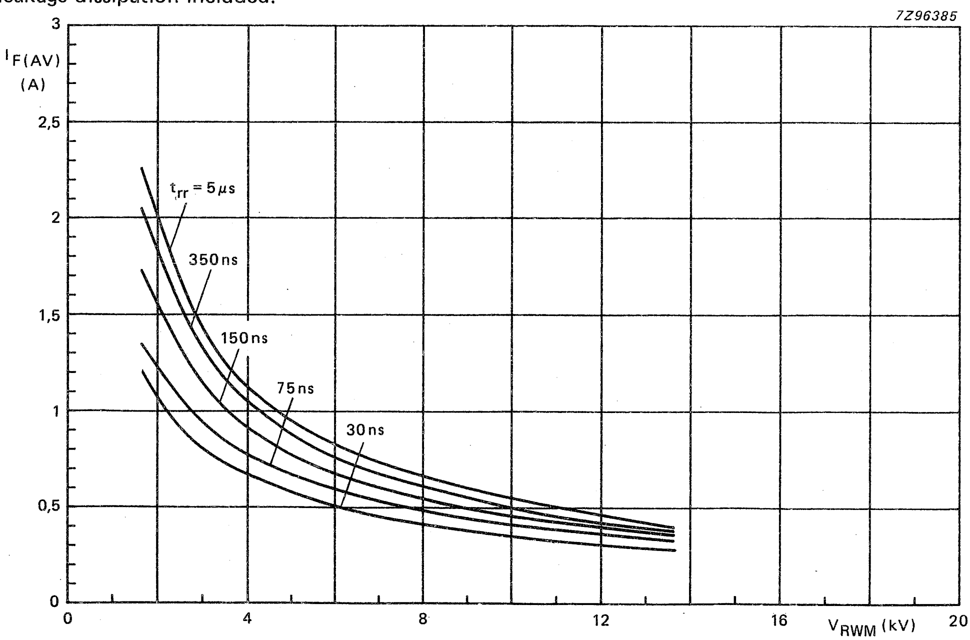


Fig. 8 **SOD-89** $R_{th\ j\text{-}oil}$ = 16K/W; P_{RSM} = 1500 W/kV at 10 μs; T_{oil} = 45 °C; duty cycle for V_{RWM} = 0,5; leakage dissipation included.

DEVICE DATA

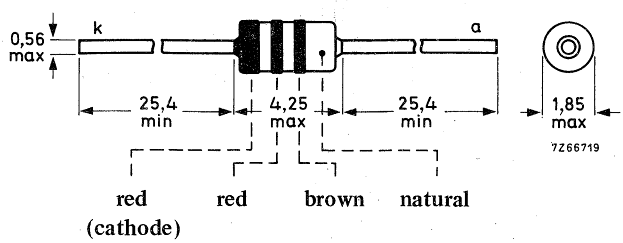
GENERAL PURPOSE DIODE

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	$R_{th\ j\text{-}a}$	=	500	K/W
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 (SOD27)



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

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

Repetitive peak reverse voltage	V_{RRM}	max.	10	V
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
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

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

CHARACTERISTICS $T_j = 25\ ^oC$

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.

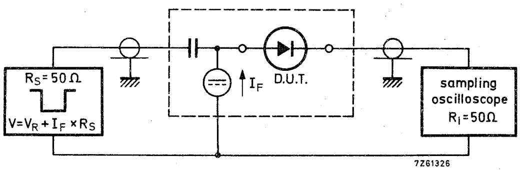
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

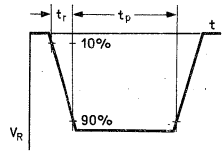
Reverse recovery time when switched from

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

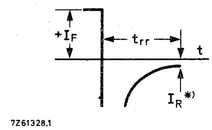
measured at $I_R = 1$ mA t_{rr} < 4 ns

Test circuit and waveforms :





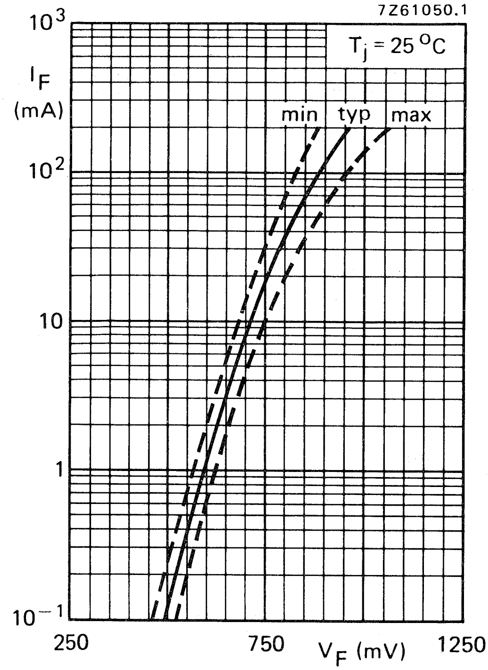
input signal



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	$\delta = 0,05$	
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}
250
750
V_F (mV)
1250
$T_j = 25\ ^oC$
min
typ
max

GENERAL PURPOSE DIODE

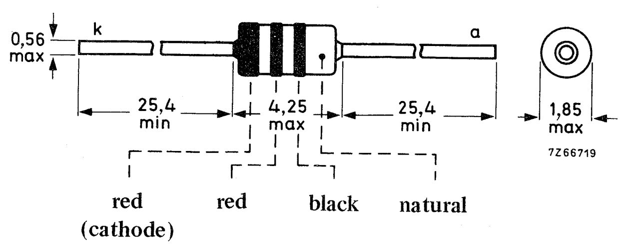
Silicon planar epitaxial diode in a DO-35 envelope; intended for general purposes.

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	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	500	K/W
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 (SOD27)



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

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

Continuous reverse voltage	V_R	max.	30	V
Repetitive peak reverse voltage	V_{RRM}	max.	30	V
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
Storage temperature	T_{stg}	−65 to +200		°C
Junction temperature	T_j	max.	200	°C

THERMAL RESISTANCE

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

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.

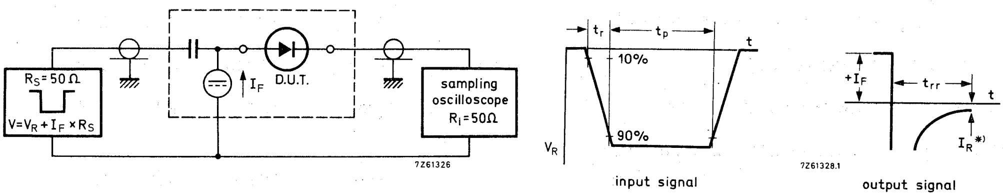
CHARACTERISTICS (continued) $T_j = 25\ ^{o}C$

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

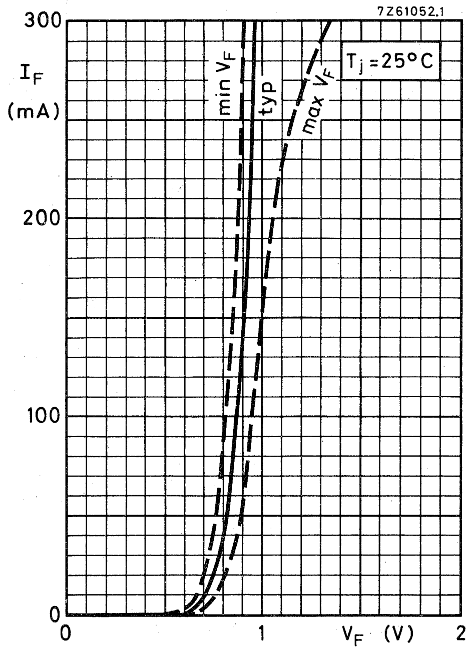
Test circuit and waveforms :



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	$\delta = 0,05$	

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
V_F (V)
2

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.

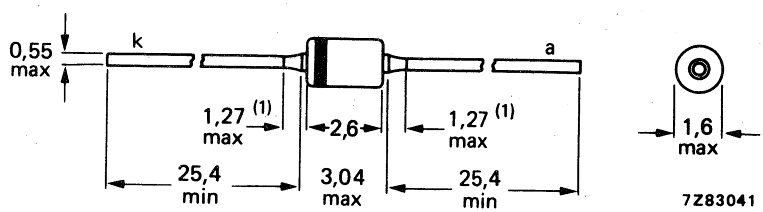
QUICK REFERENCE DATA

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.
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}		−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	K/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

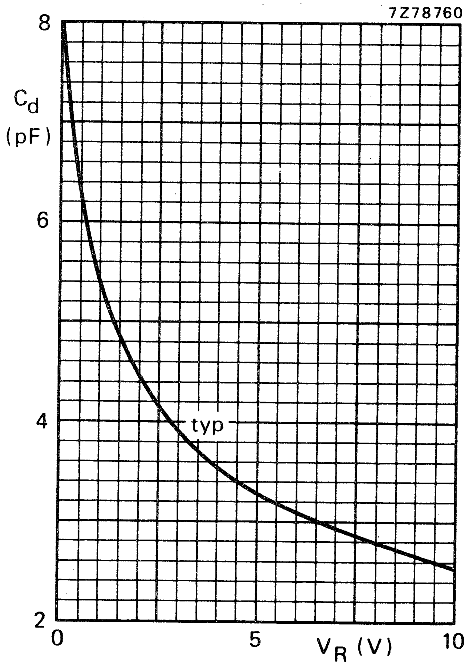


Fig. 2 f = 1 MHz; T_j = 25 °C.

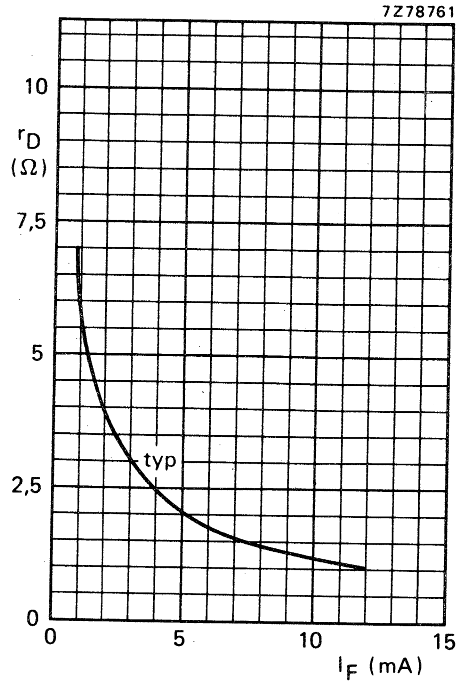


Fig. 3 f = 1 MHz; T_j = 25 °C.

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.

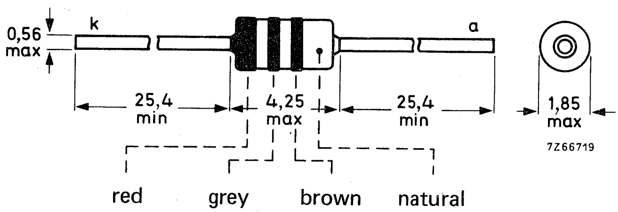
QUICK REFERENCE DATA

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).



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

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

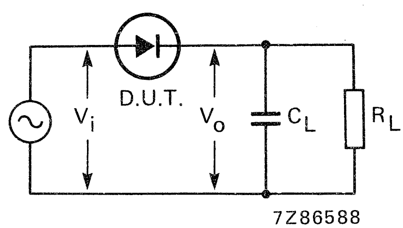


Fig. 2 Test circuit.

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.

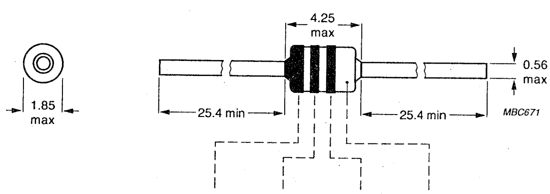
QUICK REFERENCE DATA

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).



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

Products approved to CECC 50 001-026.

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

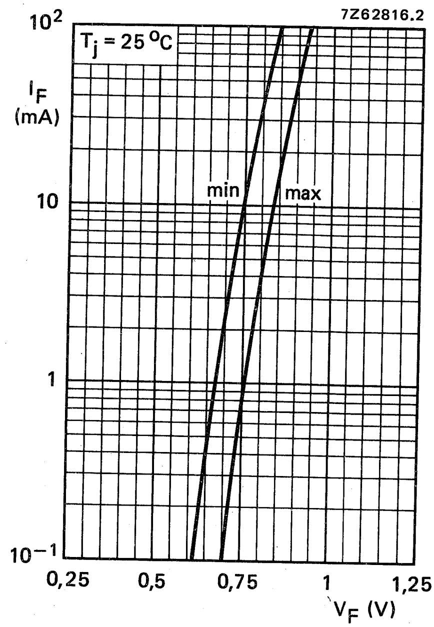


Fig. 2.

LOW VOLTAGE STABISTOR

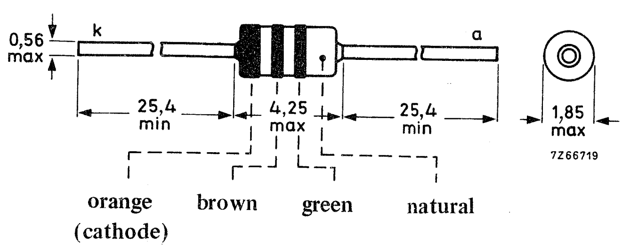
Silicon planar epitaxial diode in a DO-35 envelope primarily intended for low voltage stabilizing.

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	°C
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=	0,60	K/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 (SOD27)



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

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

Repetitive peak reverse voltage	V_{RRM}	max.	5	V	
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	
Storage temperature	T_{stg}	-65 to	+200	°C	
Junction temperature	T_j	max.	200	°C	

THERMAL RESISTANCE

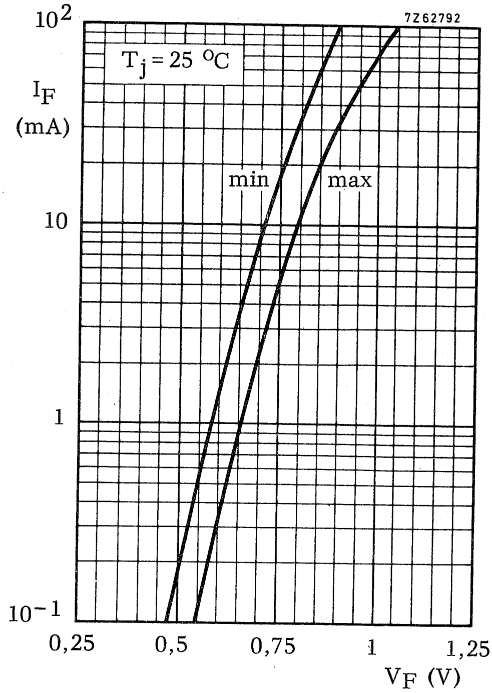
From junction to ambient in free air	$R_{th\ j-a}$	=	0,60	K/mW

CHARACTERISTICS

T_j = 25 °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/K
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
I_F
(mA)
$T_j = 25\ ^oC$
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.

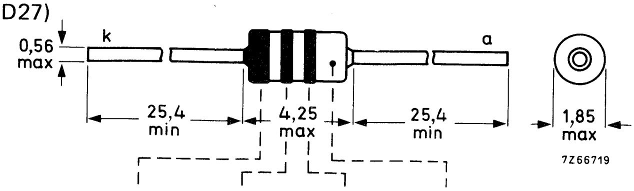
QUICK REFERENCE DATA

			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		°C
Junction temperature	T_j	max.		200		°C
Thermal resistance from junction to ambient	$R_{th\ j\text{-}a}$	=		0,60		K/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 (SOD27)



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

Diodes may be either type-branded or colour coded.

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

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

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	
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	K/mW

CHARACTERISTICS T_j = 25 °C

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; $R_L = 100\ \Omega$;

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

Test circuit and waveforms :

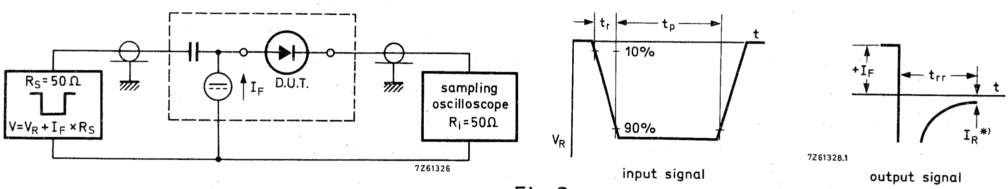


Fig. 2.

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 $\delta = 0,05$

Oscilloscope: Rise time $t_r = 0,35$ ns

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

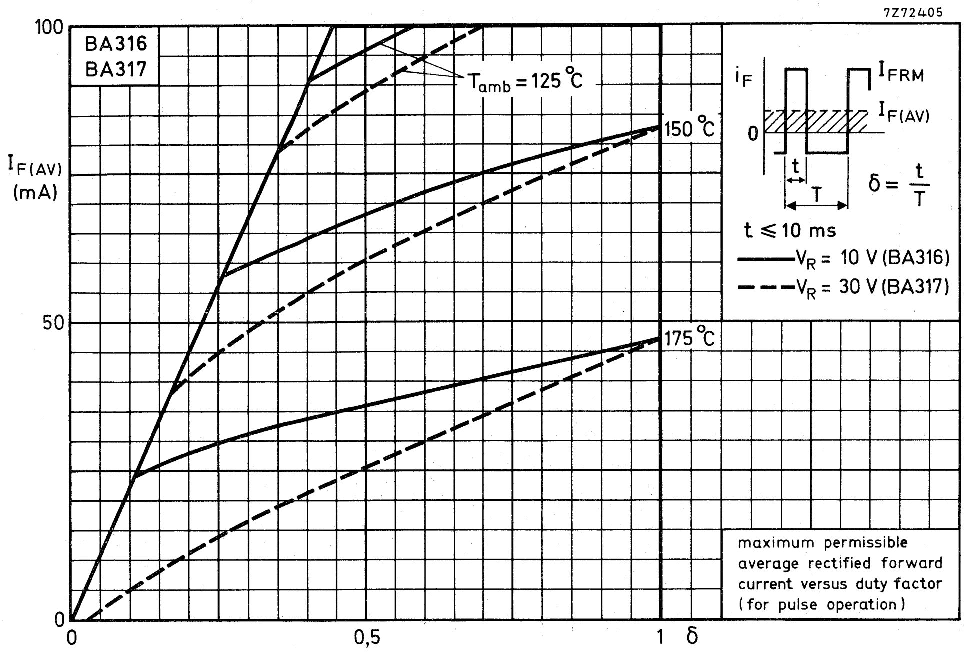

7Z72405
BA316
BA317
T_{amb} = 125 °C
150 °C
175 °C
$I_{F(AV)}$
(mA)
100
50
0
0
0,5
1
δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 10 V (BA316)
V_R = 30 V (BA317)
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 3.

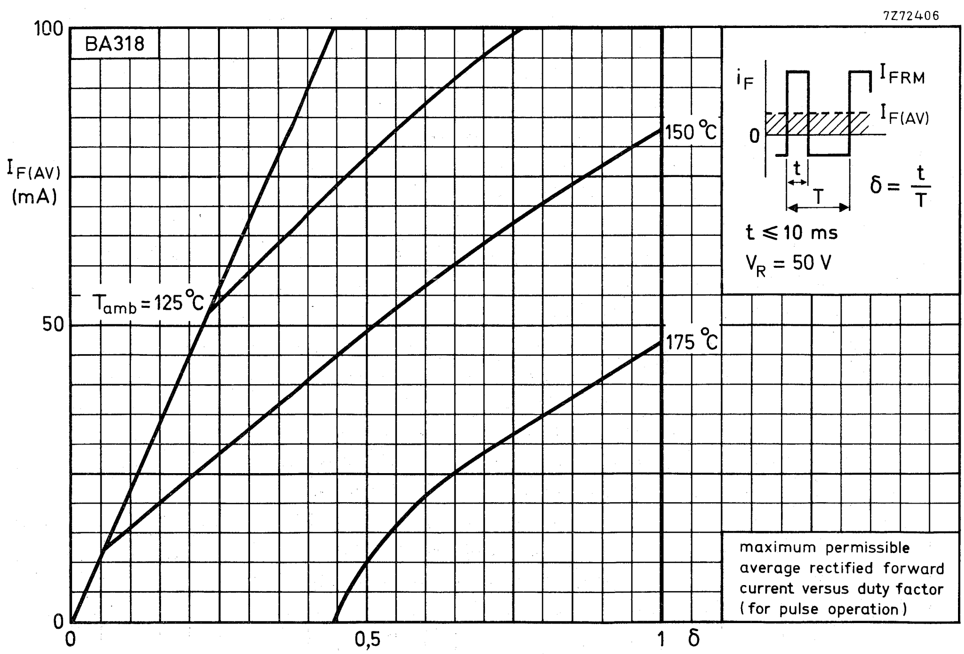

7Z72406
BA318
T_{amb} = 125 °C
150 °C
175 °C
$I_{F(AV)}$
(mA)
100
50
0
0
0,5
1
δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 4.

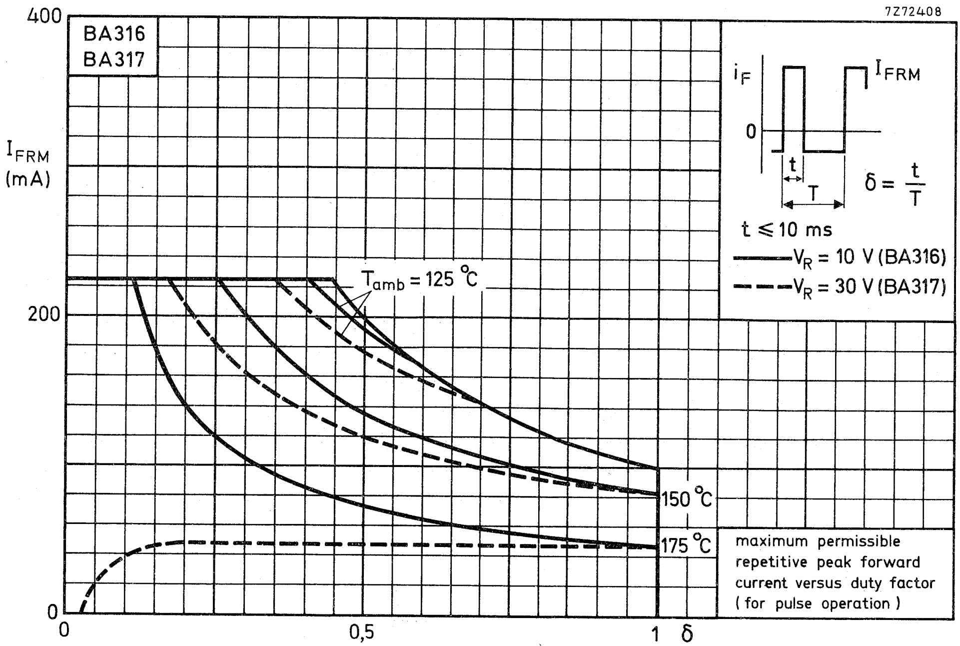

7Z72408
BA316
BA317
I_{FRM} (mA)
400
200
0
0
0,5
1 δ
T_{amb} = 125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 10 V (BA316)
V_R = 30 V (BA317)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 5.

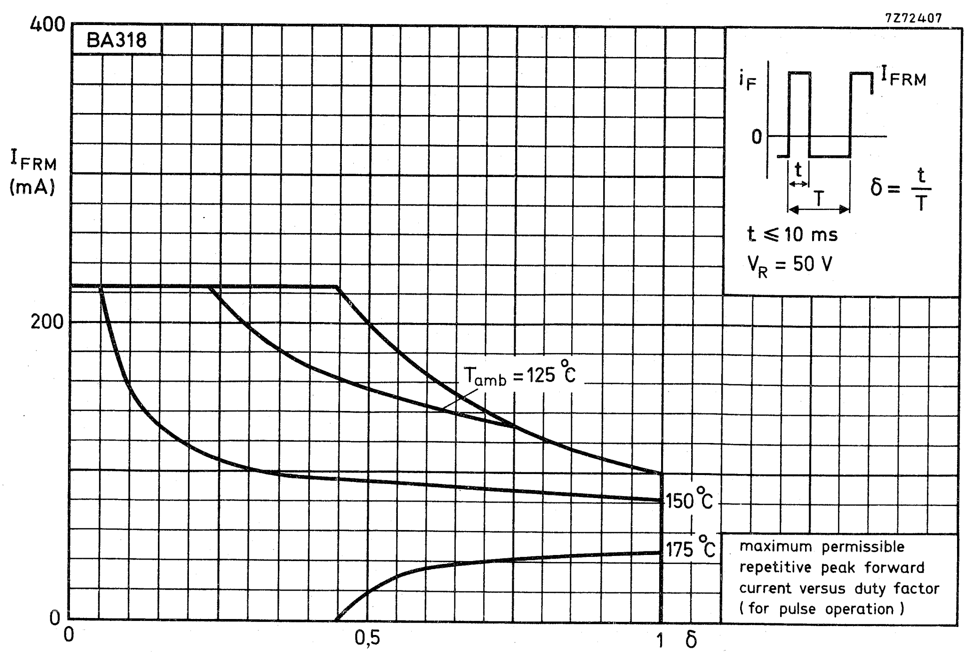

7Z72407
BA318
I_{FRM} (mA)
400
200
0
0
0,5
1 δ
T_{amb} = 125 °C
150 °C
175 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 6.

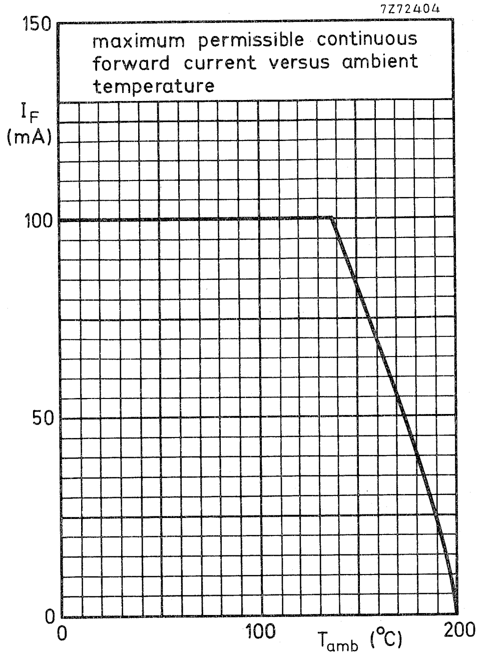


Fig. 7.

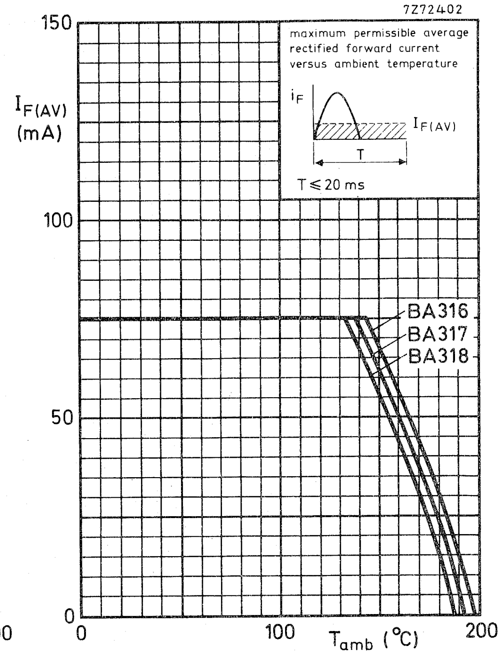


Fig. 8.

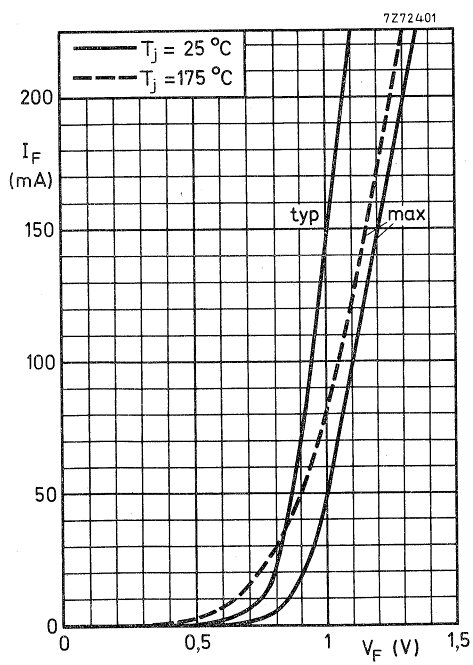


Fig. 9.

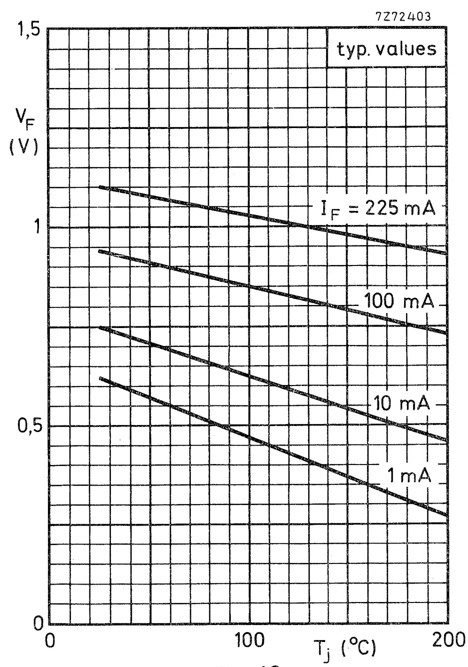


Fig. 10.

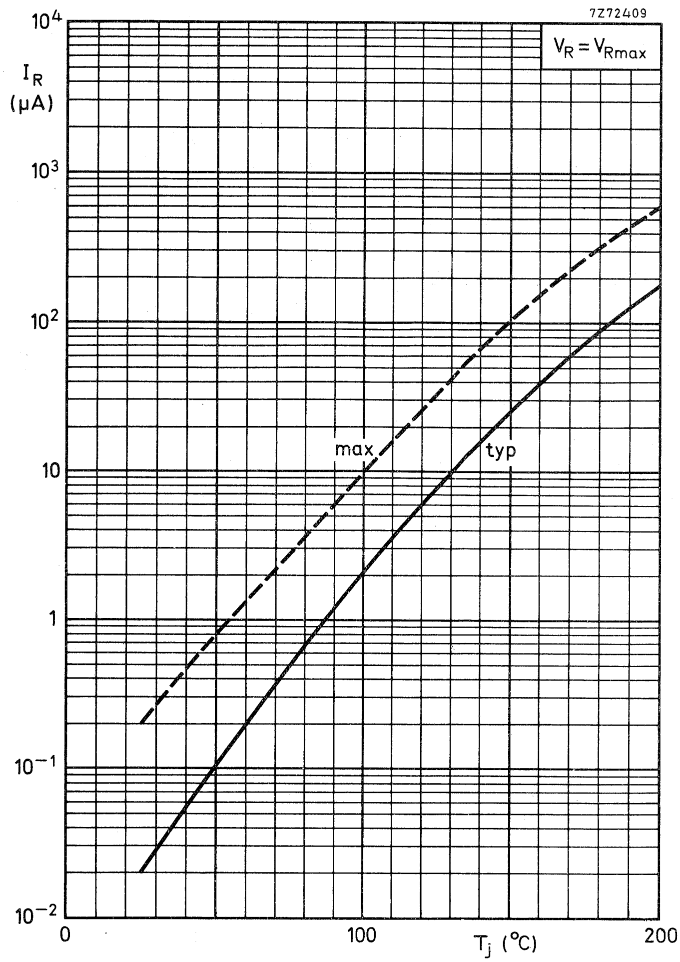

7Z72409
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

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.

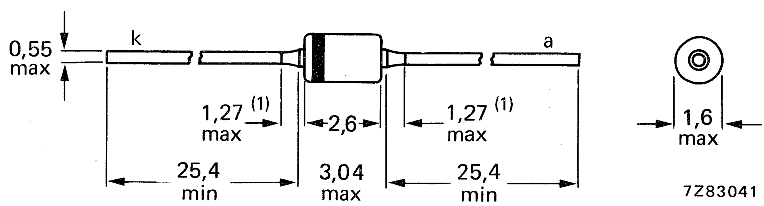
QUICK REFERENCE DATA

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

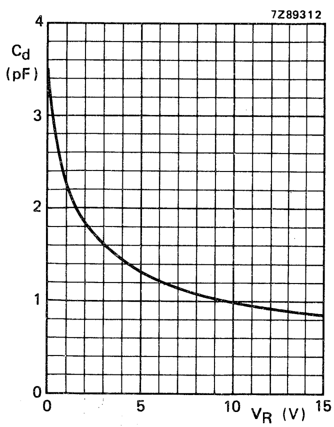


Fig. 2 Typical values
f = 1 MHz; T_j = 25 °C.

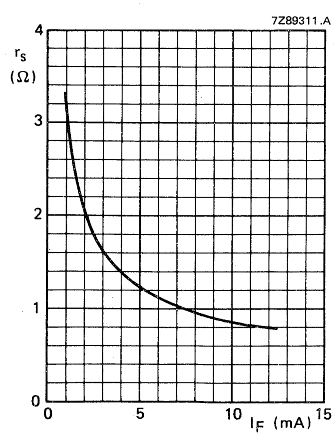


Fig. 3 Typical values
f = 1 MHz; T_j = 25 °C.

SILICON AM BAND SWITCHING DIODE FOR SURFACE MOUNTING

The BA423L is a switching diode intended for band switching in AM radio receivers.

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

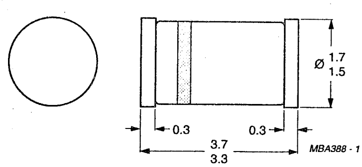
The diodes are delivered in "super 8" tape.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	20 V
Forward current (DC)	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



The cathode is indicated by a red band.

Fig. 1 SOD-80.

RATINGS

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

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

THERMAL RESISTANCE

From junction to ambient on a ceramic substrate of 8 mm x 10 mm x 0.7 mm (see soldering recommendations SOD-80)	$R_{th\ j\text{-}a}$	max.	400 K/W

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	<	5.0 µA
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

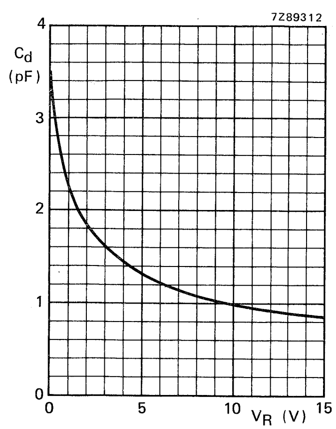


Fig. 2 Diode capacitance as a function of continuous reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

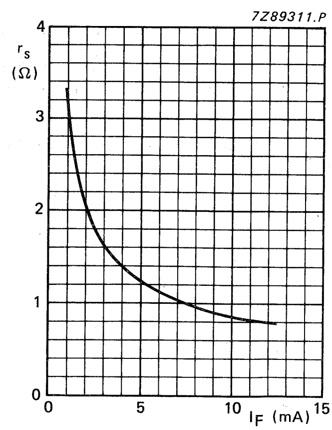


Fig. 3 Series resistance as a function of forward current; f = 1 MHz; T_j = 25 °C; typical values.

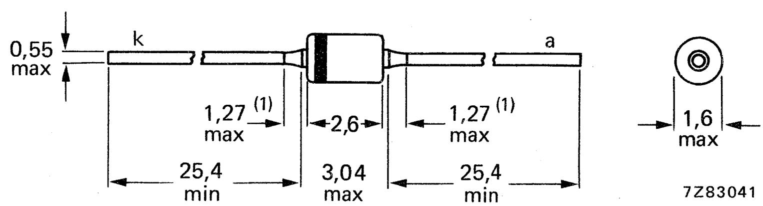
U.H.F. MIXER DIODE

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 BA481 is indicated by a grey band on the cathode side.

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/mW

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.

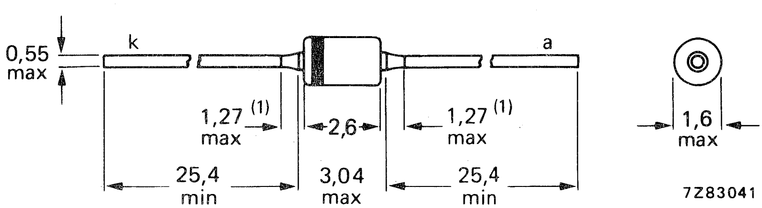
QUICK REFERENCE DATA

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.
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.	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 K/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

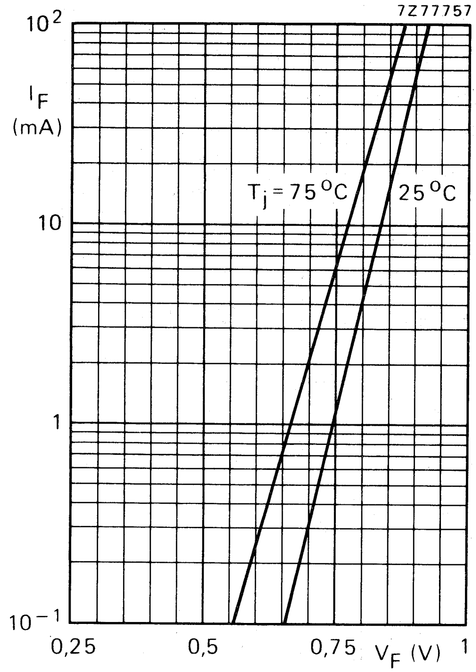


Fig. 2 Typical values.

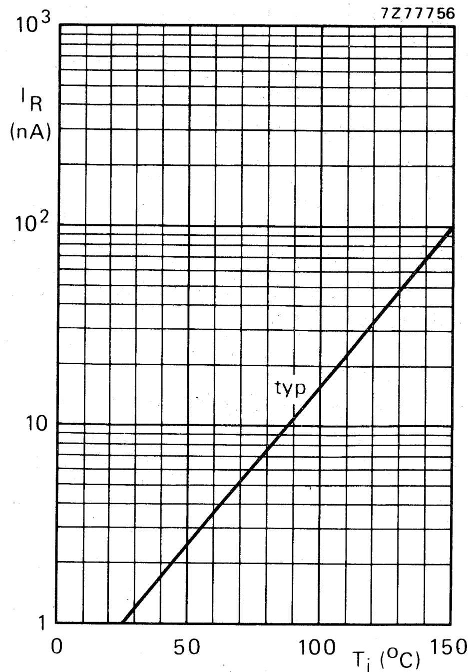


Fig. 3 $V_R = 20$ V.

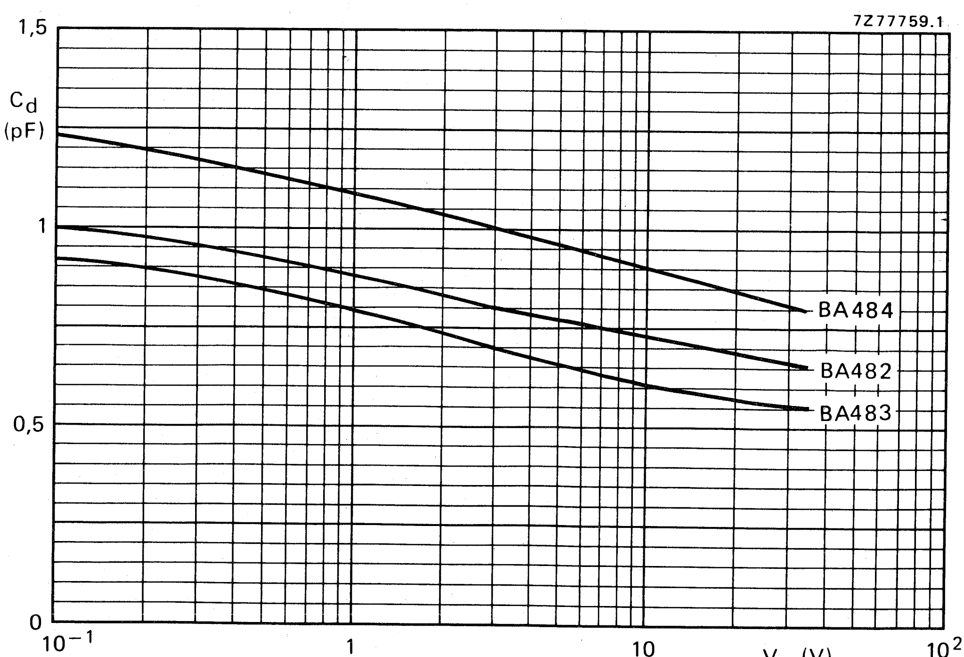


Fig. 4 Typical values; f = 1 to 100 MHz; $T_j = 25\,^oC$.

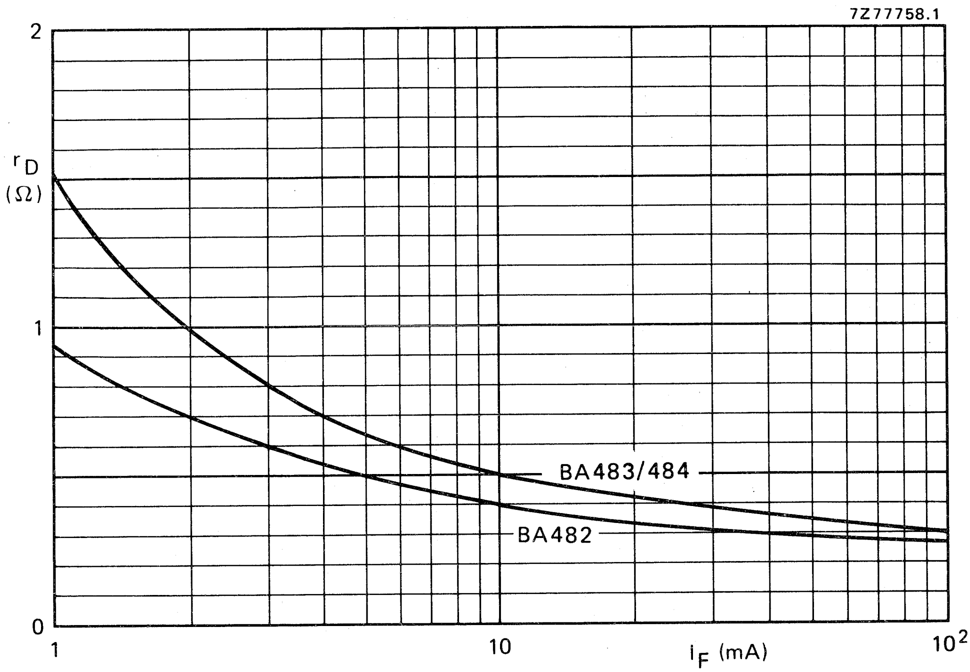


Fig. 5 Typical values; f = 200 MHz; T_j = 25 °C.

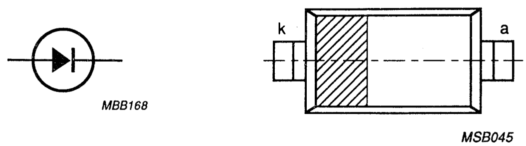
Silicon planar diode | BA582

DESCRIPTION

The BA582 is a silicon planar high performance band switching diode, intended for low loss band switching applications in VHF TV tuners. The device has a low diode capacitance and low series resistance and is encapsulated in a microminiature plastic SOD123 envelope.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		35	V
I_F	forward current		100	mA
T_j	junction temperature		150	°C
C_d	diode capacitance	V_R = 3 V; f = 1 to 100 MHz	1.1	pF
r_d	series resistance	I_F = 3 mA; f = 200 MHz	0.7	Ω



Cathode indicated by a blue band

Marking code: P

Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	35	V
I_F	forward current	DC value	–	100	mA
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	NOM.	UNIT
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	430	K/W

Note

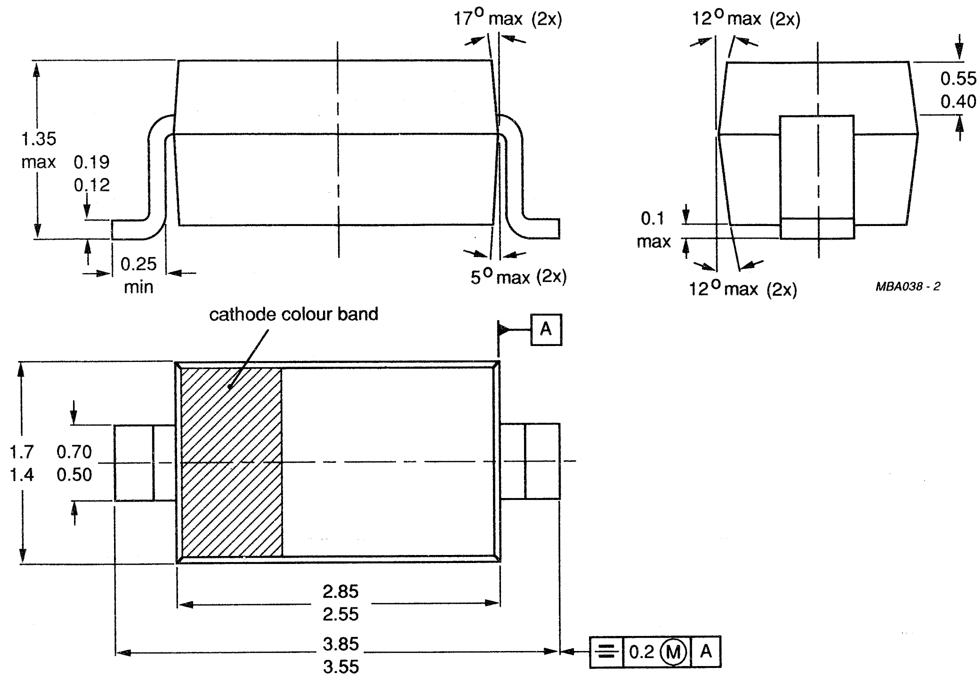
1. Mounted on a printed circuit board; 15 x 10 x 0.7 mm.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 100 mA	–	1.1	V
I_R	reverse current	V_R = 20 V	–	10	nA
		V_R = 20 V; T_{amb} = 75 °C	–	1	µA
C_d	diode capacitance	V_R = 3 V; f = 1 to 100 MHz	–	1.1	pF
r_d	series resistance	I_F = 3 mA; f = 200 MHz	–	0.7	Ω

PACKAGE OUTLINE



Dimensions in mm

Fig.2 SOD123.

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.

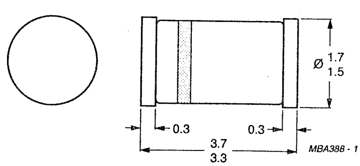
QUICK REFERENCE DATA

			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	°C
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

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		150	°C

THERMAL RESISTANCE

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

CHARACTERISTICS

T_j = 25 °C 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 °C	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 planar epitaxial high-speed diode

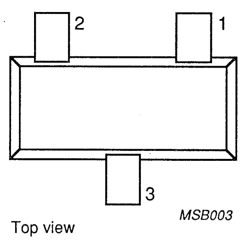
BAL74

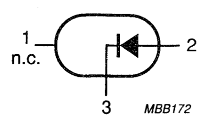
DESCRIPTION

Silicon epitaxial high-speed diode in a microminiature plastic envelope. It is intended for high-speed switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		50	V
V_{RRM}	repetitive peak reverse voltage		50	V
I_{FRM}	repetitive peak forward current		250	mA
V_F	forward voltage	$I_F = 50$ mA	1	V
t_{rr}	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	6	ns
Q_s	recovery charge	when switched from $I_F = 10$ mA to $V_R = 5$ V; $R_L = 500\ \Omega$	45	pC
T_j	junction temperature		150	°C





Marking code: BAL74 = JCp.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	50	V
V_{RRM}	repetitive peak reverse voltage		–	50	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{amb} = 25 °C	–	250	mA
I_F	forward current	DC value	–	250	mA
I_{FRM}	repetitive peak forward current		–	250	mA
I_{FSM}	non-repetitive peak forward current	t = 1 µs	–	4	A
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

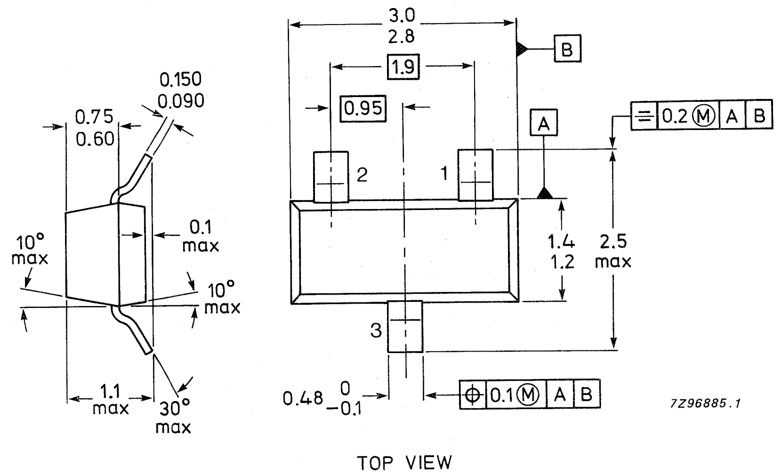
SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	mounted on FR4 printboard	500 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 μA	50	V
V_F	forward voltage	I_F = 1 mA	715	mV
		I_F = 10 mA	855	mV
		I_F = 50 mA	1000	mV
		I_F = 150 mA	1250	mV
I_R	reverse current	V_R = 50 V; T_j = 150 °C	100	μA
		V_R = 50 V	0.1	μA
C_d	diode capacitance	V_R = 0; f = 1 MHz	2	pF
t_{rr}	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	6	ns
Q_s	recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	45	pC

PACKAGE OUTLINE



Dimensions in mm.

Fig.2 SOT23.

Silicon planar epitaxial high-speed diode

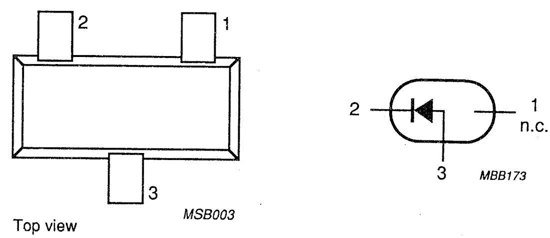
BAL99

DESCRIPTION

Silicon epitaxial high-speed diode in a microminiature plastic envelope. It is intended for high-speed switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		70	V
V_{RRM}	repetitive peak reverse voltage		70	V
I_{FRM}	repetitive peak forward current		250	mA
V_F	forward voltage	I_F = 50 mA	1	V
Q_s	recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	45	pC
T_j	junction temperature		150	°C



Marking code: BAL99 = JFp.

Fig.1 Simplified outline (SOT23) and symbol.

Silicon planar epitaxial high-speed diode

BAL99

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	70	V
V_{RRM}	repetitive peak reverse voltage		–	70	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{amb} = 25 °C	–	250	mA
I_F	forward current	DC value	–	250	mA
I_{FRM}	repetitive peak forward current		–	250	mA
I_{FSM}	non-repetitive peak forward current	t = 1 µs	–	4.5	A
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

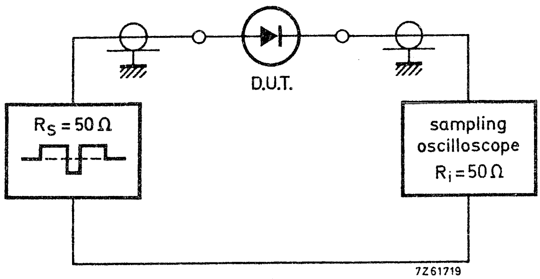
THERMAL RESISTANCE

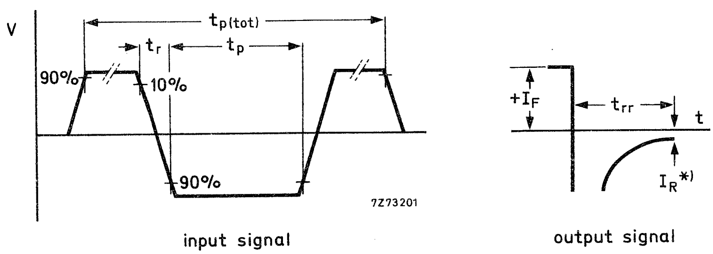
SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	mounted on FR4 printboard	500 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA	70	–	V
V_F	forward voltage	I_F = 1 mA	–	715	mV
		I_F = 10 mA	–	855	mV
		I_F = 50 mA	–	1000	mV
		I_F = 150 mA	–	1250	mV
I_R	reverse current	V_R = 25 V; T_j = 150 °C	–	30	µA
		V_R = 70 V	–	1	µA
		V_R = 70 V; T_j = 150 °C	–	50	µA
C_d	diode capacitance	V_R = 0; f = 1 MHz	–	1.5	pF
t_{rr}	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; see Fig.2	–	6	ns
Q_s	recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω; see Fig.3	–	45	pC



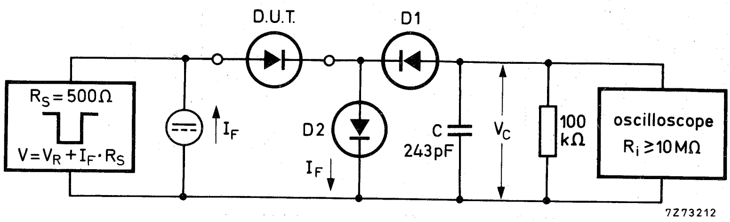


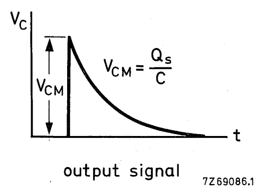
Input signal:
rise time of reverse pulse (t_r) = 0.6 ns
reverse pulse duration (t_p) = 30 ns
duty factor (δ) = 0.0025
total pulse duration ($t_{p(tot)}$) = 0.2 μs.

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

Oscilloscope:
rise time (t_r) = 0.35 ns.

Fig.2 Reverse recovery time test circuit and waveforms.





D1 = BAW62

D2 = diode with minority carrier life time (10 mA: < 200 ps).

Input signal:

rise time of reverse pulse (t_r) = 2 ns

reverse pulse duration (t_p) = 400 ns

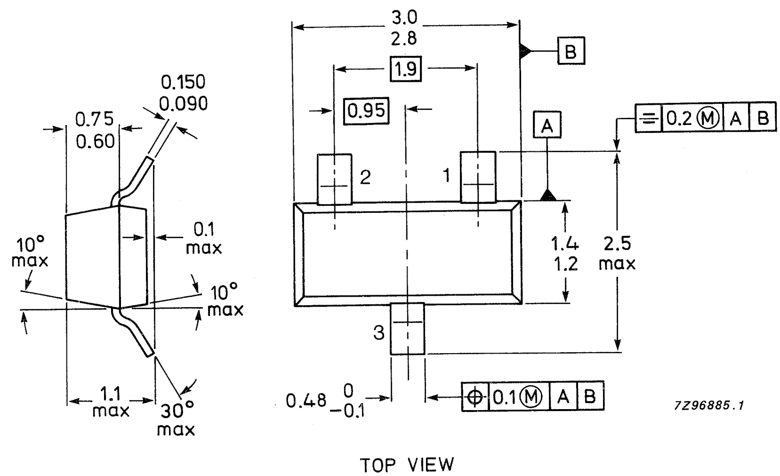
duty factor (δ) = 0.02.

Circuit capacitance:

$C \leq 7$ pF (C = oscilloscope input capacitance + parasitic capacitance).

Fig.3 Recovery charge test circuit and waveforms.

PACKAGE OUTLINE



Dimensions in mm.

Fig.4 SOT23.

Silicon glass passivated avalanche diodes

BAS11/BAS12

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed axial-leaded SOD91 implosion diode (ID) glass envelopes. They are primarily intended for general purpose applications, e.g. scan and flyback rectifiers, protection diodes etc. in television circuits. An advantage of these diodes is their capability of absorbing reverse transient energy.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RW}	working reverse voltage		
	BAS11	300	V
	BAS12	400	V
$I_{F(AV)}$	average forward current	300	mA
I_{FSM}	non-repetitive peak forward current	4	A
P_{RRM}	repetitive peak reverse power dissipation	75	W
t_{rr}	reverse recovery time	1	µs

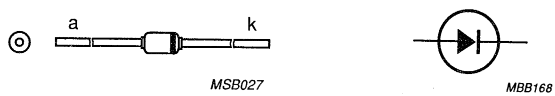


Fig.1 Simplified outline (SOD91) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RW}	working reverse voltage				
	BAS11		–	300	V
	BAS12		–	400	V
V_R	continuous reverse voltage				
	BAS11		–	300	V
	BAS12		–	400	V
$I_{F(AV)}$	average forward current	DC value	–	350	mA
		averaged over any 20 ms period	–	300	mA
I_{FRM}	repetitive peak forward current	t = 10 ms; f = 50 Hz	–	900	mA
		δ = 0.1; f = 15 kHz	–	2	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms; half sinewave; T_j = 150 °C prior to surge	–	4	A
		t = 10 µs; square wave; T_j = 150 °C prior to surge	–	30	A
I_{RRM}	repetitive peak reverse current	t = 10 µs; square wave; f = 50 Hz; T_{amb} = 25 °C	–	150	mA
P_{RRM}	repetitive peak reverse power dissipation	t = 10 µs; square wave; f = 50 Hz; T_{amb} = 25 °C	–	75	W
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	340 K/W

Note

1. Mounted on a printed circuit board at 8 mm lead length.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 300 mA	–	–	1.1	V
		I_F = 900 mA	–	–	1.3	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA				
	BAS11		330	–	–	V
	BAS12		440	–	–	V
I_R	reverse current	$V_R = V_{R\,max}$	–	–	250	nA
		$V_R = V_{R\,max}$; T_j = 125 °C	–	–	10	µA
C_d	diode capacitance	V_R = 0; f = 1 MHz	–	–	20	pF
		V_R = 50 V; f = 1 MHz	–	–	2.5	pF
Q_s	reverse recovery charge	note 1	–	70	–	nC
t_{rr}	reverse recovery time	note 1	–	–	1	µs
$\lvert dI_R/dt \rvert$	maximum slope of reverse recovery current	note 1	–	2	–	A/µs

Note

1. When switched from I_F = 400 mA to V_R = 30 V with $-dI_F/dt$ = 400 mA/µs.

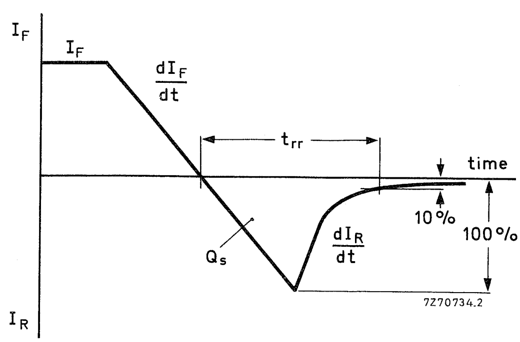
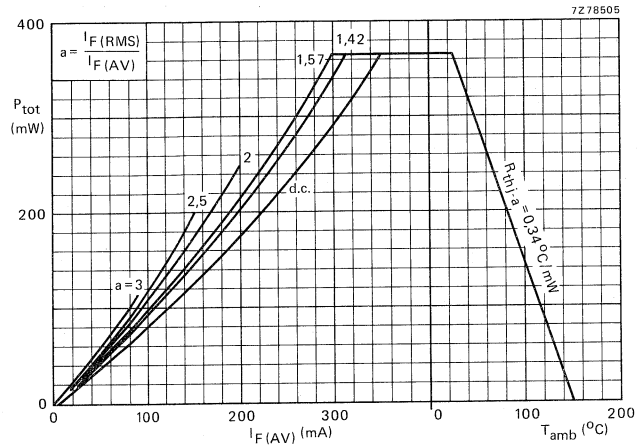


Fig.2 Definitions of Q_s, t_{rr} and dI_R/dt.

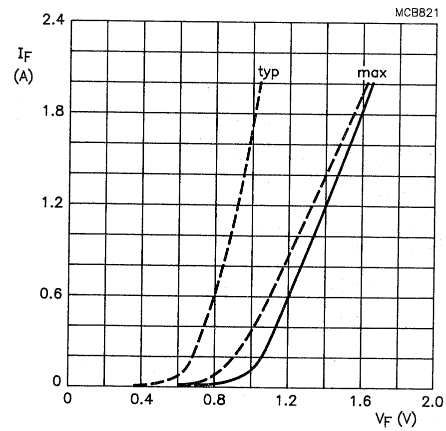


From the left-hand graph, the total power dissipation can be found as a function of the average output current.

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.

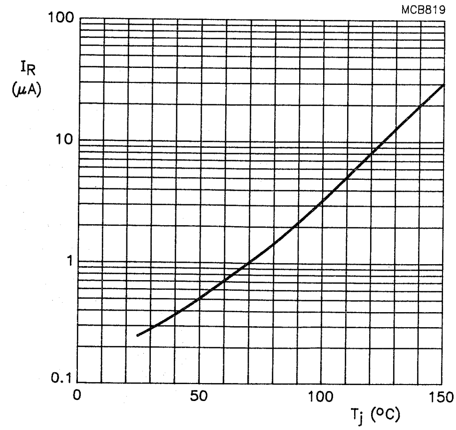
Fig.3 Total power dissipation as a function of forward current and ambient temperature.



Solid line = T_j = 25 °C.

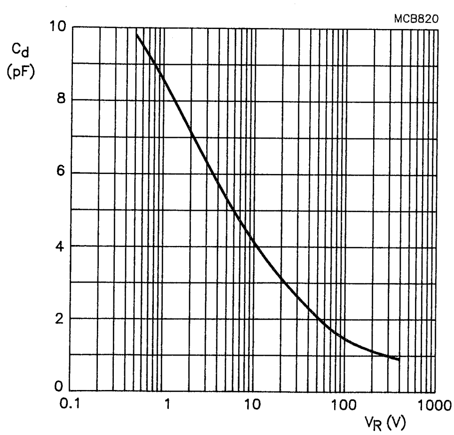
Dotted line = T_j = 150 °C.

Fig.4 Forward voltage as a function of forward current.



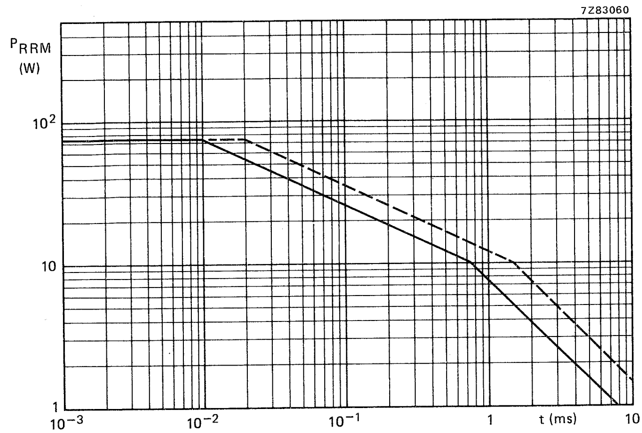
$V_R = V_{Rmax.}$

Fig.5 Reverse current as a function of junction temperature.



f = 1 MHz; T_j = 25 °C.

Fig.6 Diode capacitance as a function of reverse voltage.



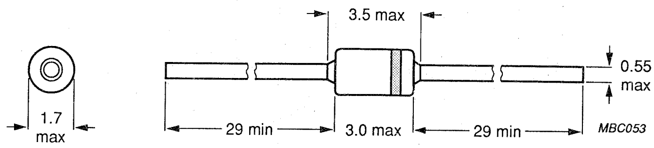
t ≥ 20 ms; T_j = 25 °C.

Solid line = rectangular waveform, δ ≤ 0.01.

Dotted line = triangular waveform, δ ≤ 0.02.

Fig.7 Maximum permissible repetitive peak reverse power as a function of pulse duration.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.8 SOD91.

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.

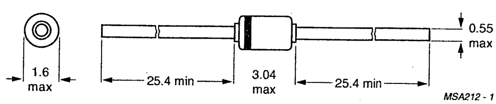
QUICK REFERENCE DATA

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	K/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).



The diodes are type branded

Products approved to CECC 50 001-061.

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	K/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:

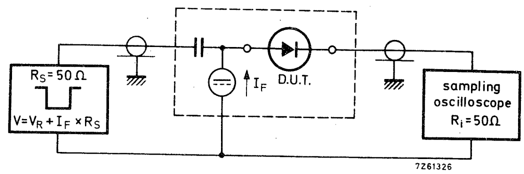
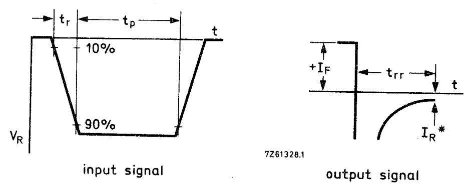


Fig. 2 Test circuit.



* 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.	500 mA
Junction temperature	T_j	max.	150 °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

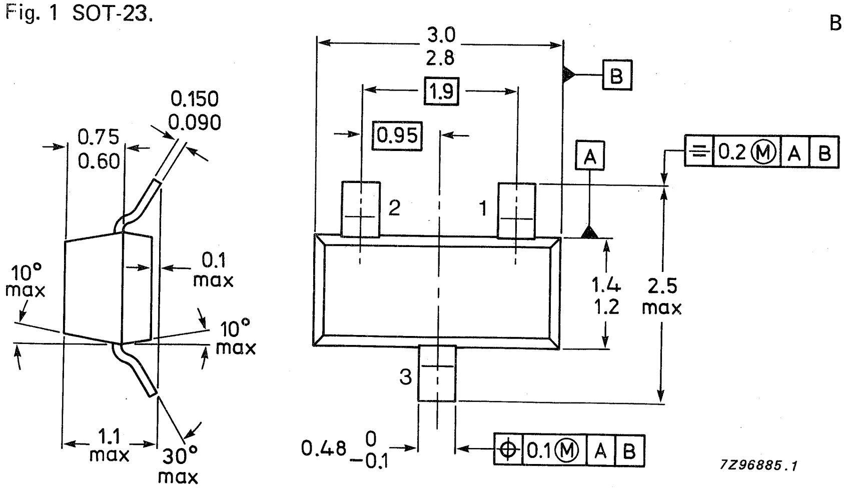
MECHANICAL DATA

Dimensions in mm

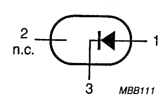
Marking code

BAS16 = A6p

Fig. 1 SOT-23.



TOP VIEW



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 (DC)	I_F	max.	250 mA
Repetitive peak froward current	I_{FRM}	max.	500 mA
Non-repetitive peak forward current (per crystal)			
t = 1 μs	I_{FSM}	max.	2 A
t = 1 ms	I_{FSM}	max.	1 A
t = 1 s	I_{FSM}	max.	0,5 A
Storage temperature range	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

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. $I_{F(AV)}$ = 150 mA, $t_{(AV)} \leqslant$ 1 ms, for sinusoidal operation.

** See *Thermal characteristics.*

▲ Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

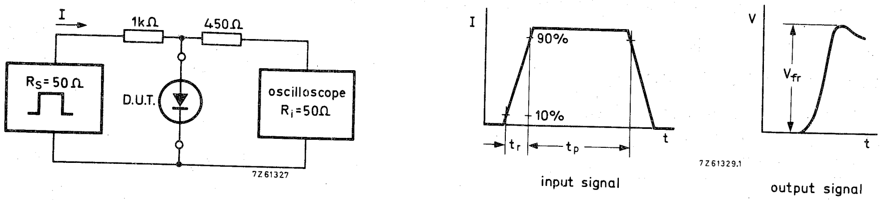


Fig. 2 Forward recovery voltage test circuit and waveforms.

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).

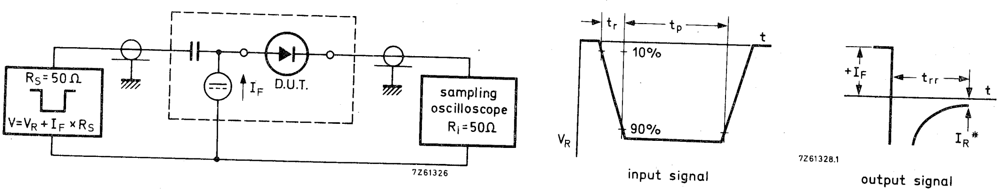


Fig. 3 Reverse recovery time test circuit and waveforms.

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

* t_{rr} up to I_R = 1 mA.

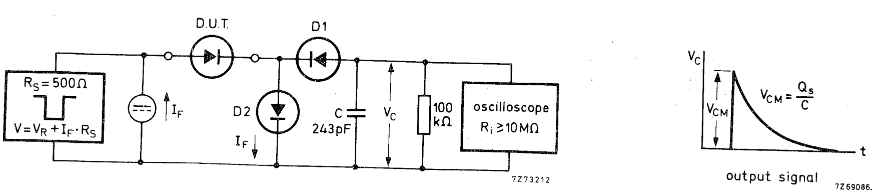


Fig. 4 Recovery charge test circuit and waveform.

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).

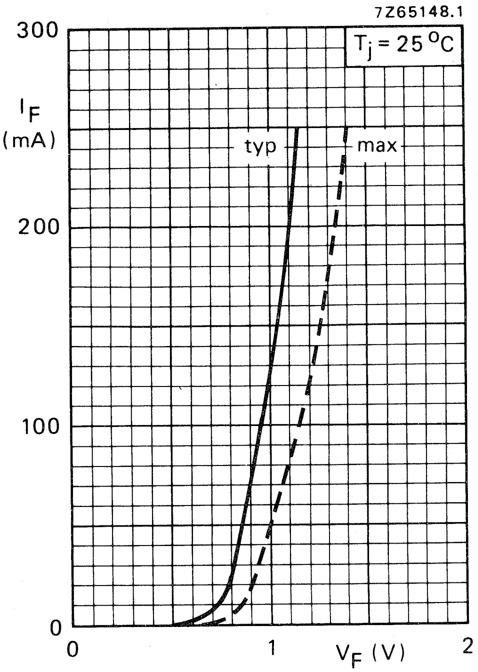


Fig. 5.

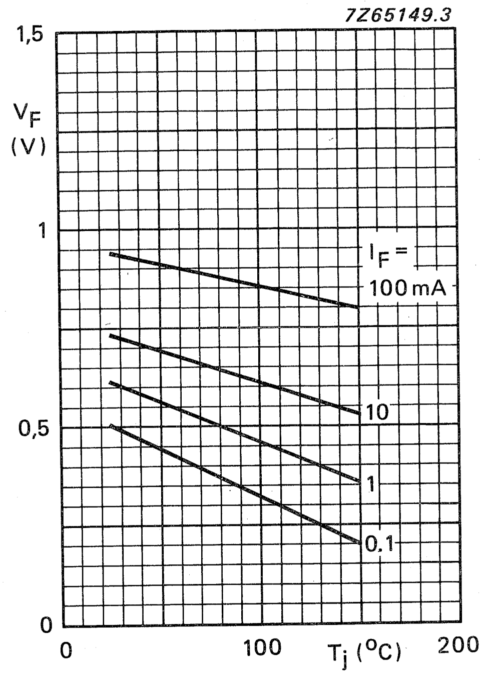


Fig. 6 Typical values.

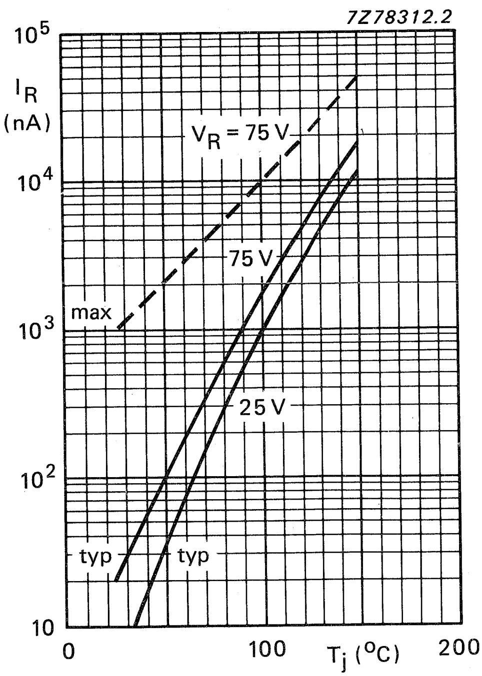


Fig. 7

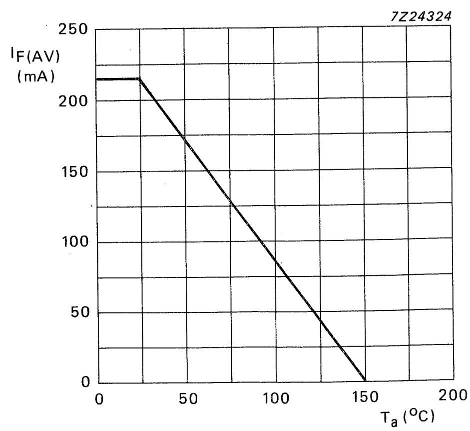


Fig. 8 Current derating curve.

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.

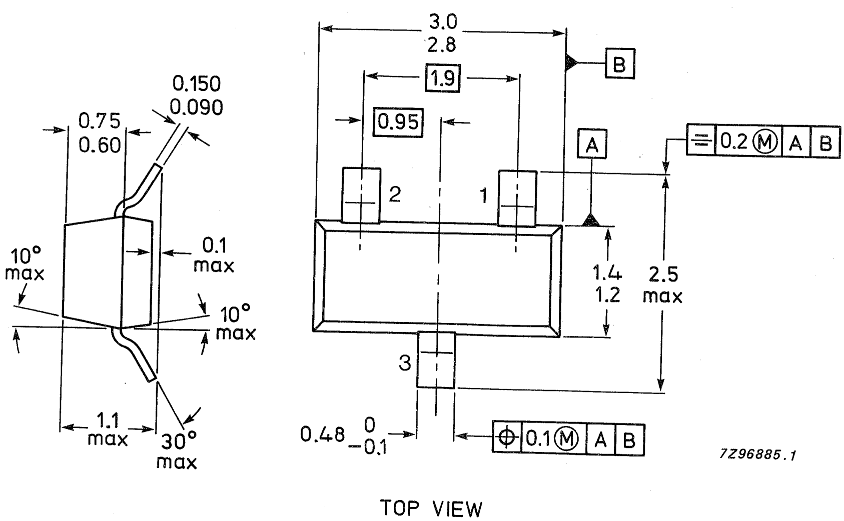
QUICK REFERENCE DATA

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

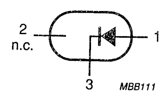
Fig. 1 SOT-23.

Dimensions in mm



Marking code

BAS17 = A91



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		^oC
Junction temperature	T_j	max.	150	^oC

THERMAL CHARACTERISTICS **

From junction to ambient *	$R_{th\ j\text{-}t}$	=	420	K/W

CHARACTERISTICS

T_j = 25 ^oC 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

* Mounted on a ceramic substrate of 7 mm x 5 mm x 0,5 mm.
** See *Thermal characteristics.*

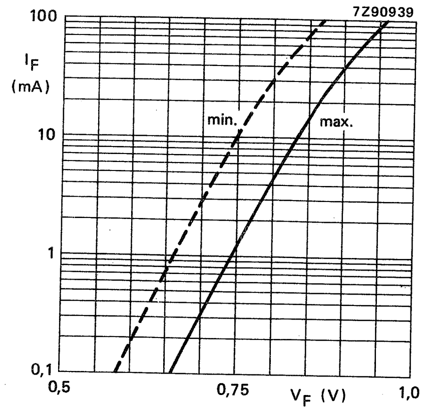


Fig. 2 Forward current as a function of forward voltage.

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

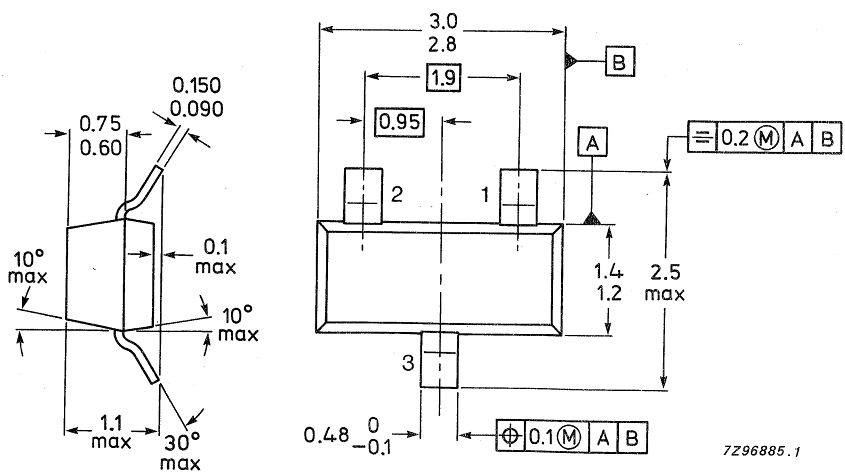
MECHANICAL DATA

Fig. 1 SOT-23.

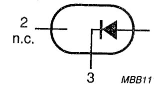
Dimensions in mm

Marking code

BAS19 = JPp
BAS20 = JRp
BAS21 = JSp



TOP VIEW



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 voltage	V_{RRM}	max.	120	200	250	V
Non-repetitive peak forward current (per crystal)						
t = 1 μs	I_{FSM}	max.		2,5		A
t = 1 s	I_{FSM}	max.		0,5		A
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.		200		mA
Forward current (DC) up to T_{amb} = 25 °C*	I_F	max.		200		mA
Repetitive peak forward current	I_{FRM}	max.		625		mA
Storage temperature range	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.		250		mW

THERMAL RESISTANCE**

From junction to ambient*	$R_{th\,j\text{-}a}$	=	500	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				
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	$V_{(BR)R}$	>	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

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.
** See *Thermal characteristics.*

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; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA	t_{rr}	<	50 ns

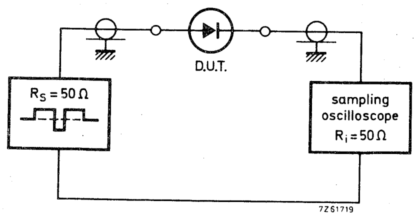


Fig. 2 Test circuit.

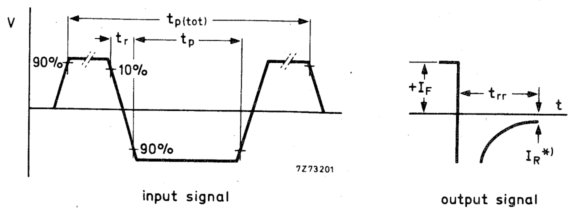


Fig. 3 Waveforms; $I_R = 3$ mA.

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.

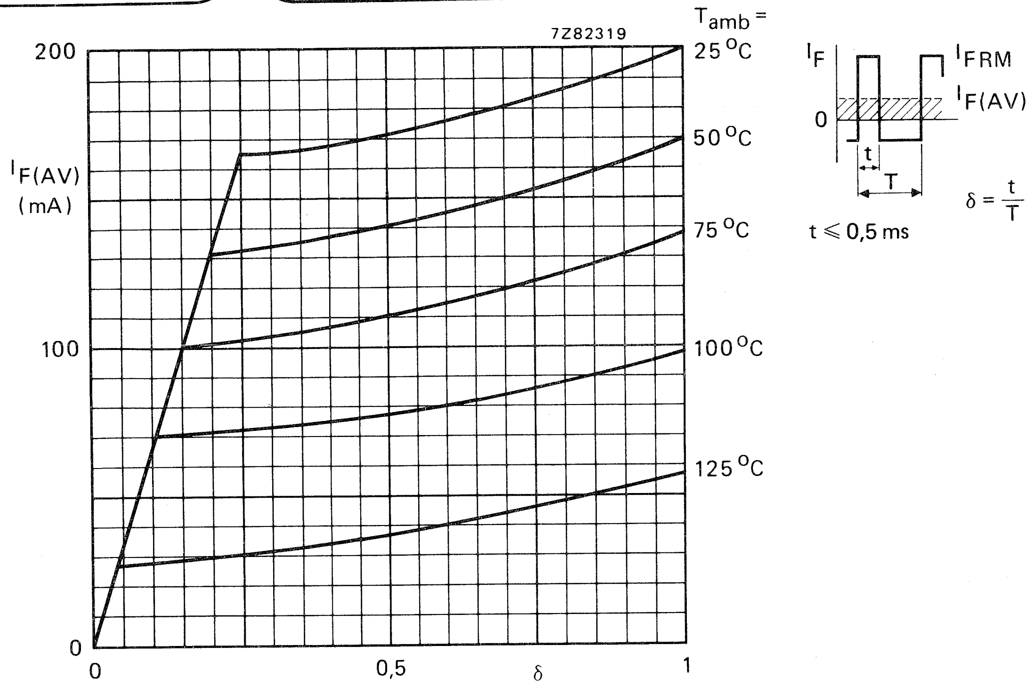


Fig. 4 BAS19; maximum permissible average rectified forward current for pulse operation as a function of the duty factor at V_R = 100 V.

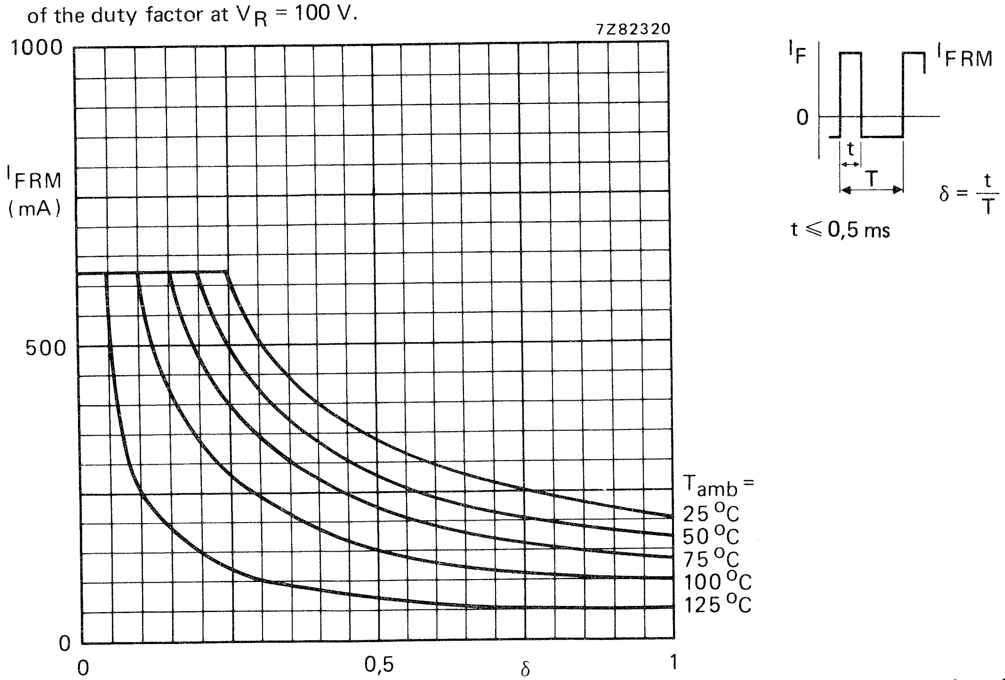


Fig. 5 BAS19; maximum permissible repetitive peak forward current for pulse operation as a function of the duty factor at V_R = 100 V.

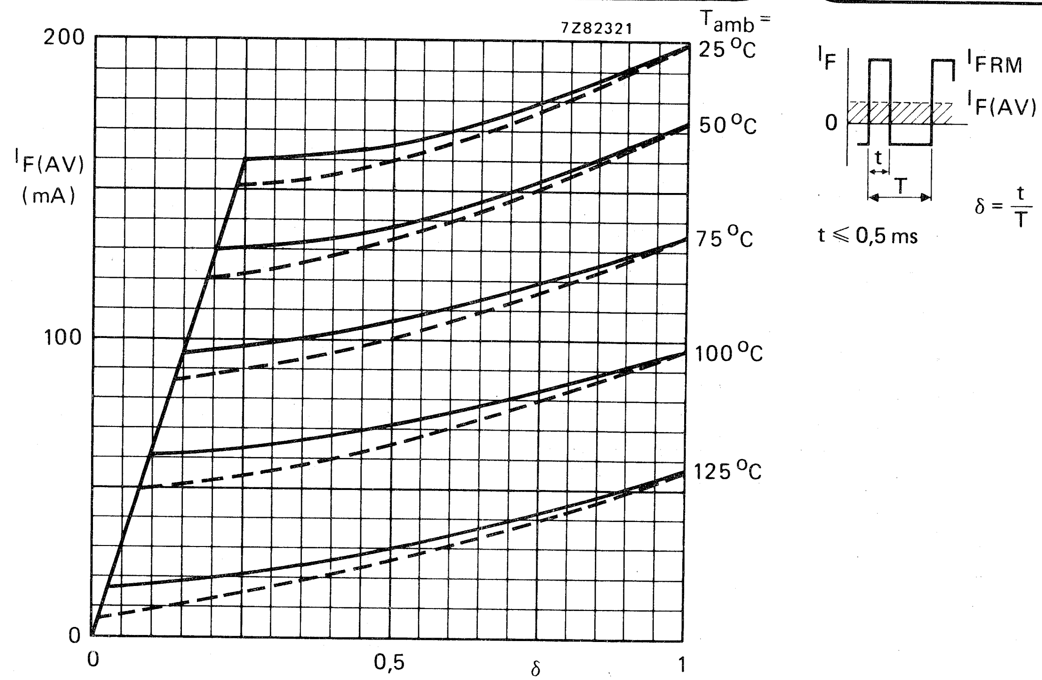


Fig. 6 BAS20/21; maximum permissible average rectified forward current for pulse operation as a function of the duty factor.

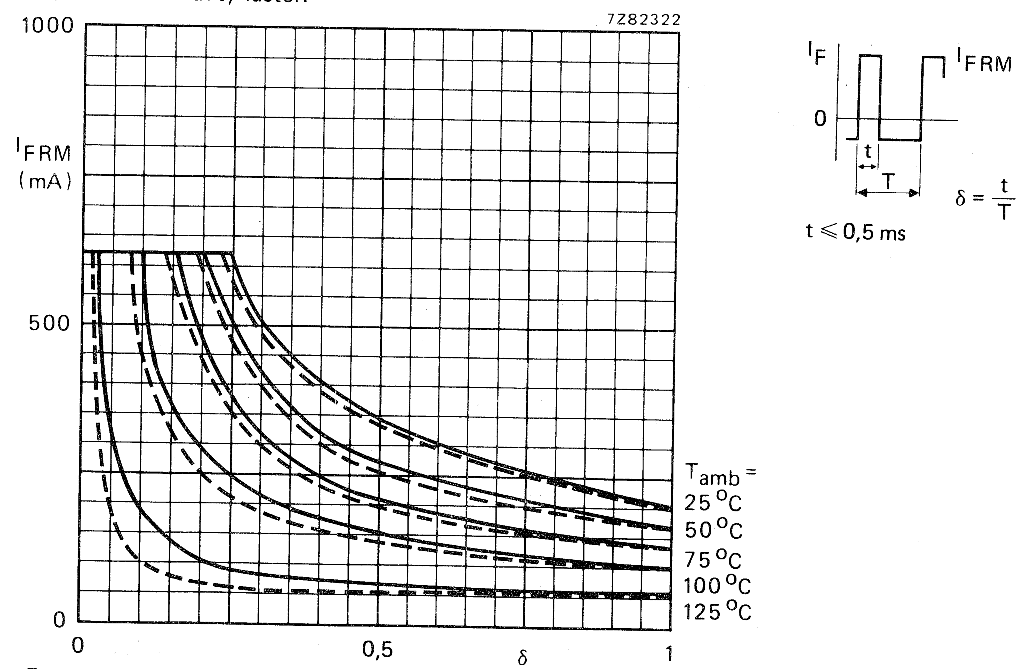


Fig. 7 BAS20/21; maximum permissible repetitive peak forward current for pulse operation as a function of the duty factor.

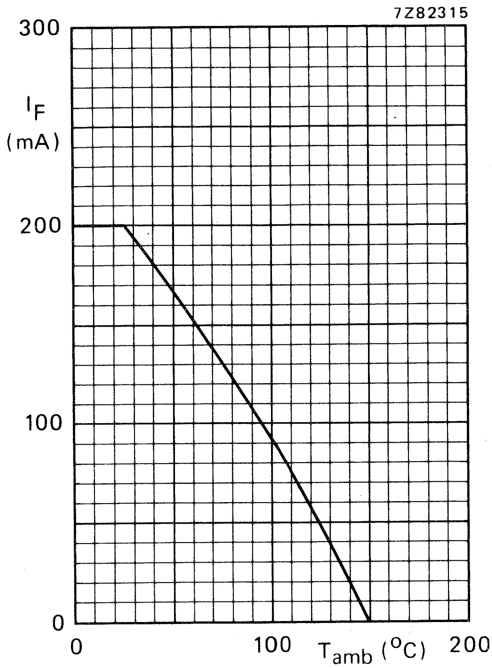


Fig. 8.

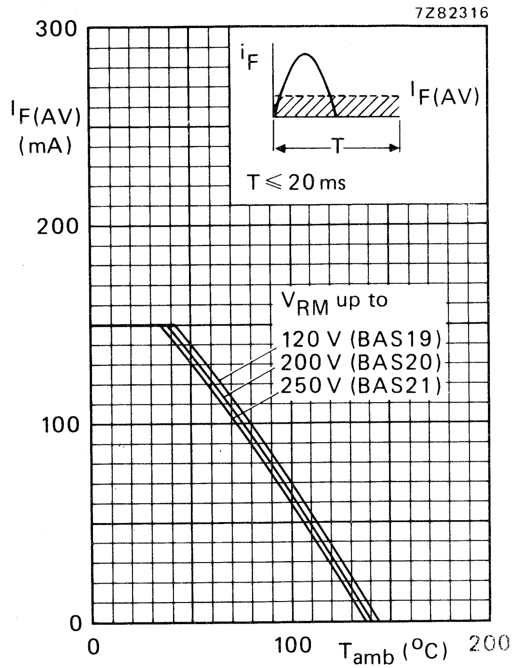


Fig. 9.

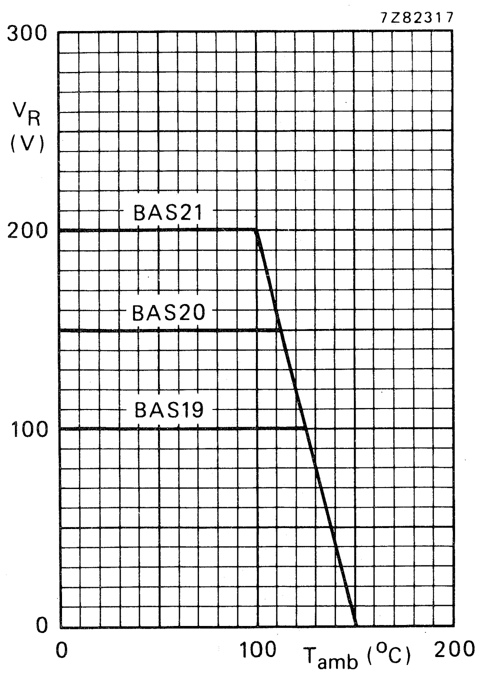


Fig. 10.

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.

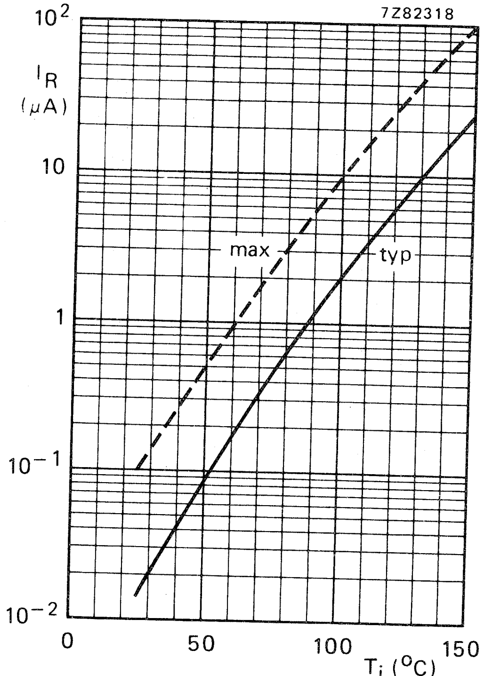


Fig. 11.

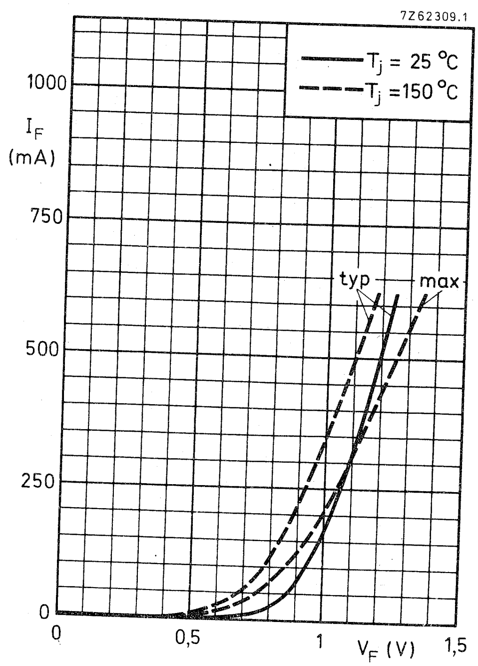


Fig. 12.

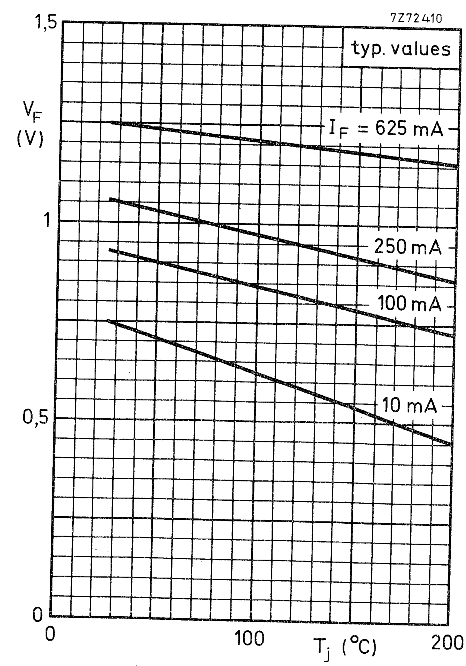


Fig. 13.

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.

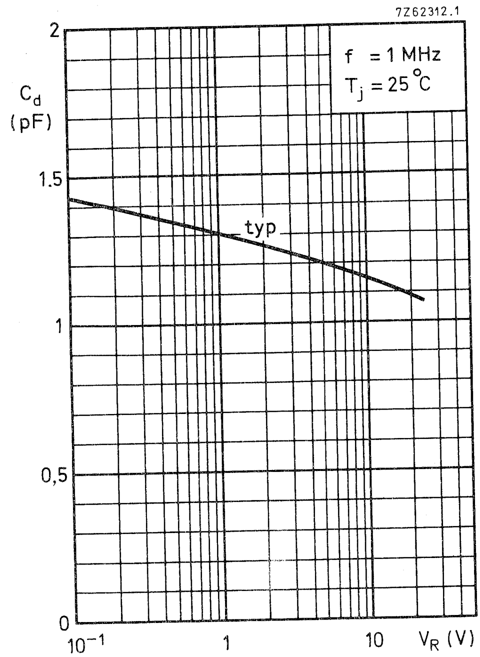

7Z62312.1
f = 1 MHz
T_j = 25 °C
C_d (pF)
2
1.5
1
0,5
0
typ
10^{-1}
1
10
V_R (V)

Fig. 14.

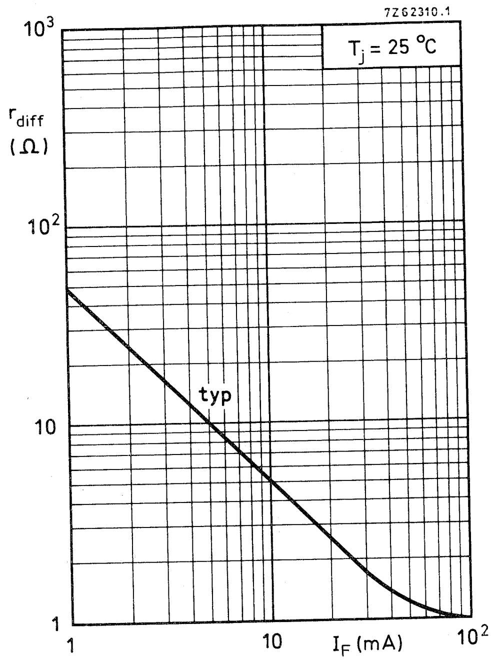

7Z62310.1
T_j = 25 °C
r_{diff} (Ω)
10^3
10^2
10
1
typ
1
10
I_F (mA)
10^2

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

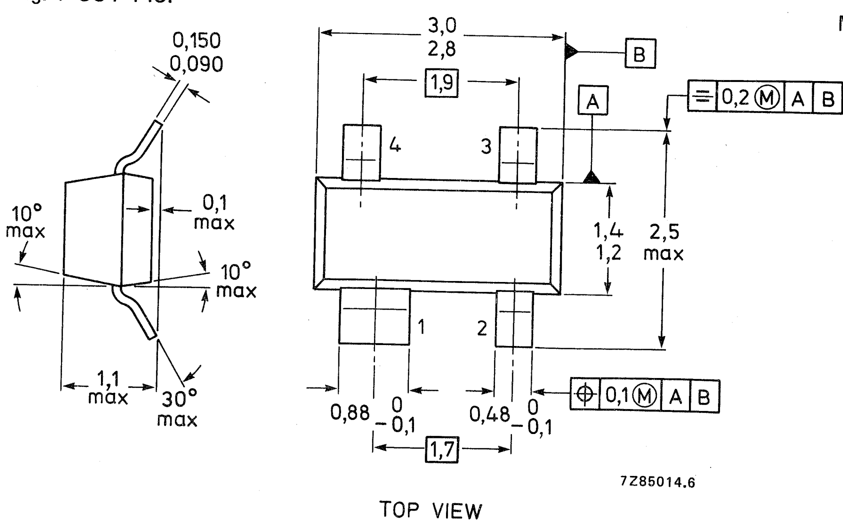
Continuous reverse voltage	V_R	max.	75 V
Repetitive peak reverse voltage	V_{RRM}	max.	85 V
Repetitive peak forward current	I_{FRM}	max.	500 mA
Junction temperature	T_j	max.	150 °C
Forward voltage at I_F = 50 mA	V_F	<	1,0 V
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100 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

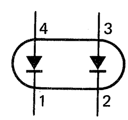
MECHANICAL DATA

Fig. 1 SOT-143.

Dimensions in mm

Marking code: JT_p





Product approved to CECC 50 001-074.

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.	215 mA
Forward current (DC)	I_F	max.	215 mA
Repetitive peak forward current	I_{FRM}	max.	500 mA
Non-repetitive peak forward current (per crystal)			
t = 1 µs	I_{FSM}	max.	2 A
t = 1 ms	I_{FSM}	max.	1 A
t = 1 s	I_{FSM}	max.	0,5 A
Storage temperature range	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

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.

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

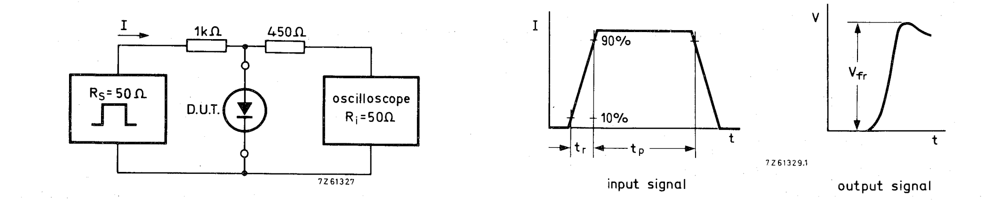


Fig. 2 Forward recovery voltage test circuit and waveforms.

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

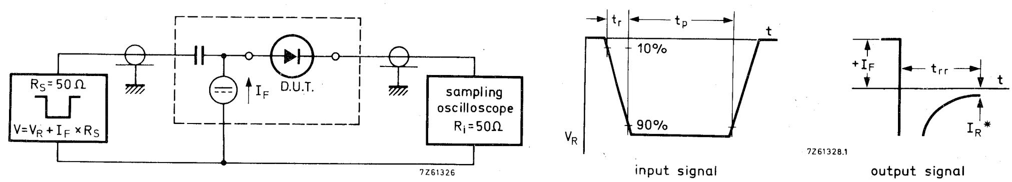


Fig. 3 Reverse recovery time test circuit and waveforms.

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

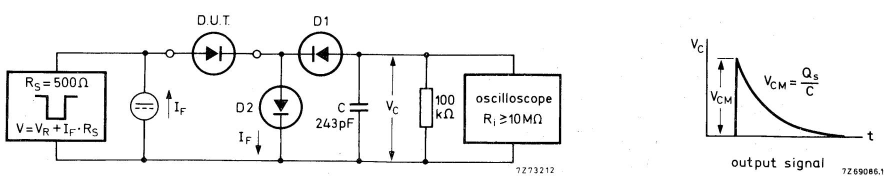


Fig. 4 Recovery charge test circuit and waveform.

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

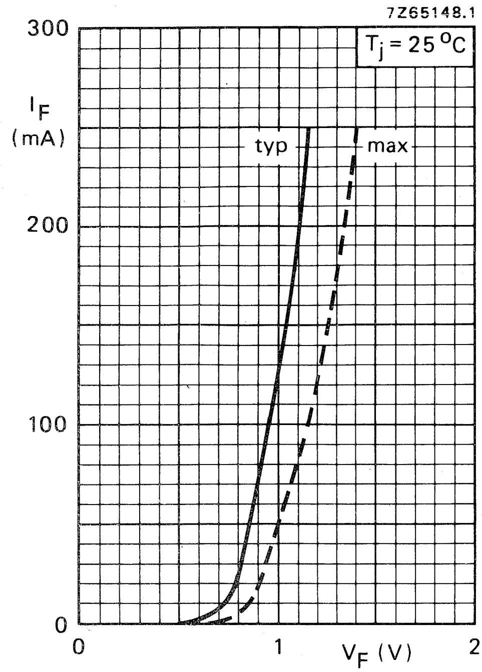


Fig. 5.

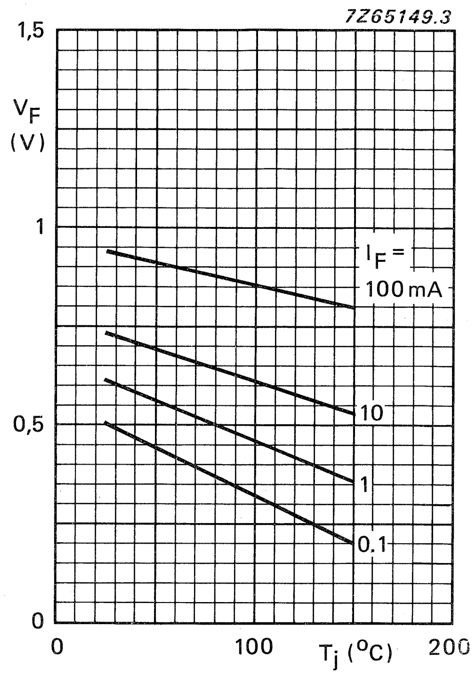


Fig. 6 Typical values.

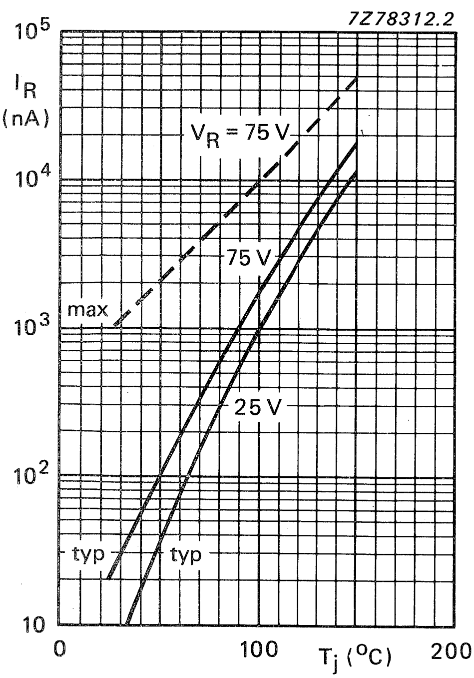


Fig. 7.

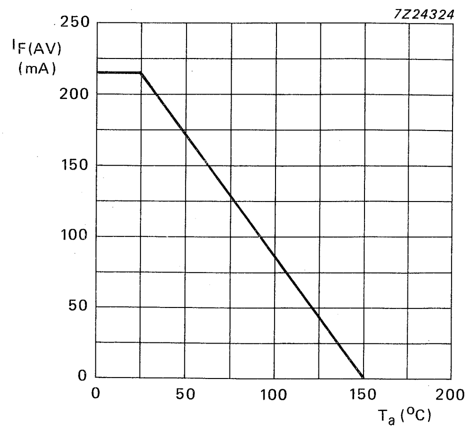


Fig. 8 Current derating curve.

SILICON PLANAR EPITAXIAL HIGH-SPEED 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)

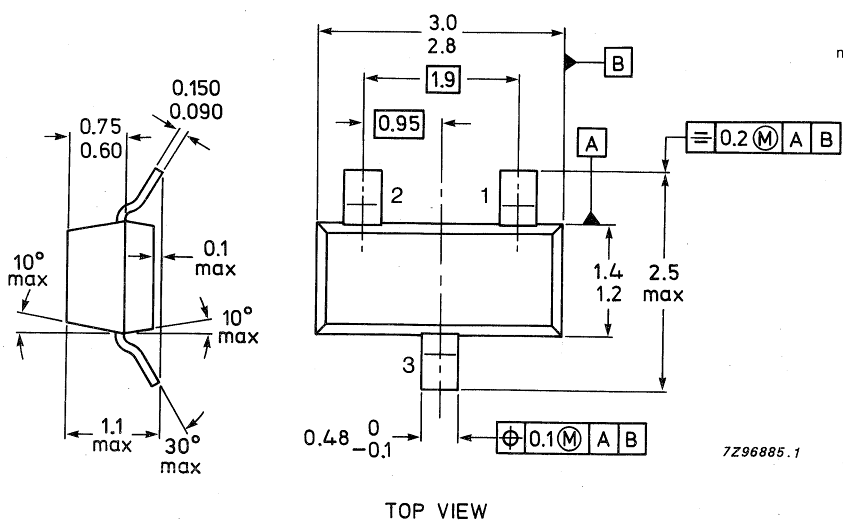
Continuous reverse voltage	V_R	max.	90	V
Repetitive peak forward current	I_{FRM}	max.	600	mA
Forward current	I_F	max.	250	mA
Junction temperature	T_j	max.	150	°C
Forward voltage at I_F = 50 mA	V_F	<	0,84	V
Reverse recovery time when switched from I_F = 30 mA to I_R = 30 mA; R_L = 100 Ω; measured at I_R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

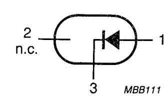
MECHANICAL DATA

Fig. 1 SOT-23.

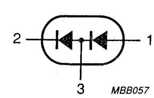
Dimensions in mm

Marking code:
BAS29 = L20
BAS31 = L21
BAS35 = L22

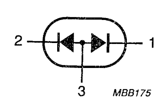




BAS29



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
Repetitive peak reverse current	I_{RRM}	max.	600 mA
Average rectified forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250 mA
Non-repetitive peak forward current			
t = 1 μs; T_j = 25 °C prior to surge; per crystal	I_{FSM}	max.	3 A
t = 1 s; T_j = 25 °C prior to surge; per crystal	I_{FSM}	max.	0,75 A
Forward current (DC)	I_F	max.	250 mA
Repetitive peak reverse energy $t_p \geqslant 50$ μs; $f \leqslant 20$ Hz; T_j = 25 °C	E_{RRM}	max.	5,0 mJ
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 = 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	<	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

* See Thermal Characteristics.
** When mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

HIGH-SPEED SILICON DIODE FOR SURFACE MOUNTING

The BAS32L is a planar epitaxial high-speed diode designed for fast logic applications.

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

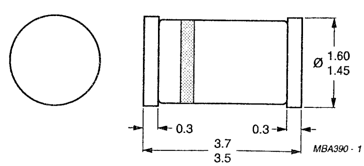
The diodes are delivered in "super 8" tape.

QUICK REFERENCE DATA

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	<	1.0	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}	<	4.0	ns

MECHANICAL DATA

Dimensions in mm



The cathode is indicated by a black band

Fig. 1 SOD-80C.

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 (DC)	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 range	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	<	1.0	V
I_F = 100 mA; T_j = 100 °C	V_F	<	0.93	V
Reverse breakdown voltage				
I_R = 100 μA	$V_{(BRR)}$	>	100	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	<	5.0	μA
V_R = 75 V; T_j = 150 °C	I_R	<	100	μA
Diode capacitance				
V_R = 0; f = 1 MHz	C_d	<	2.0	pF
Forward recovery voltage when switched to				
I_F = 50 mA; t_r = 20 ns	V_{fr}	<	2.5	V

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

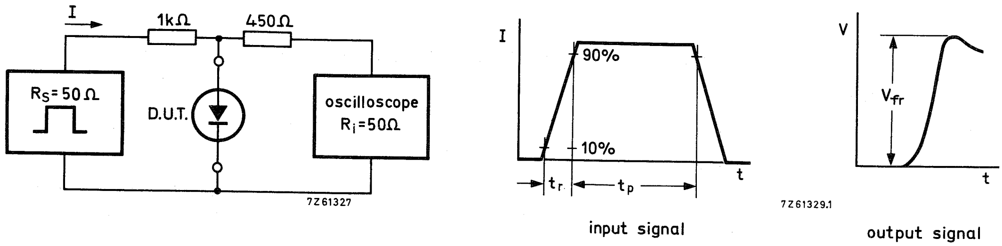


Fig. 2 Forward recovery voltage test circuit and waveforms.

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)

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

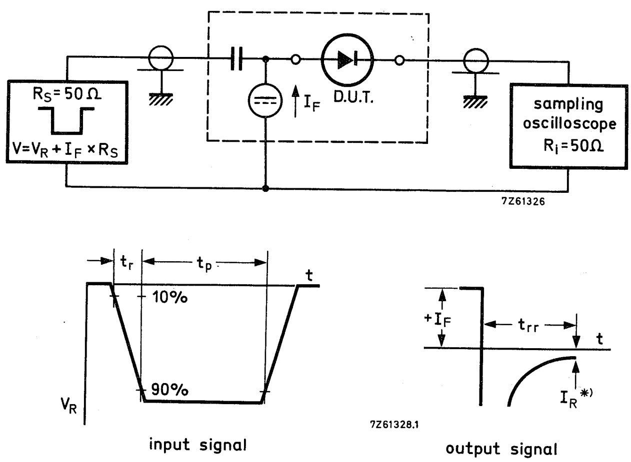


Fig. 3 Reverse recovery time test circuit and waveforms.

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)

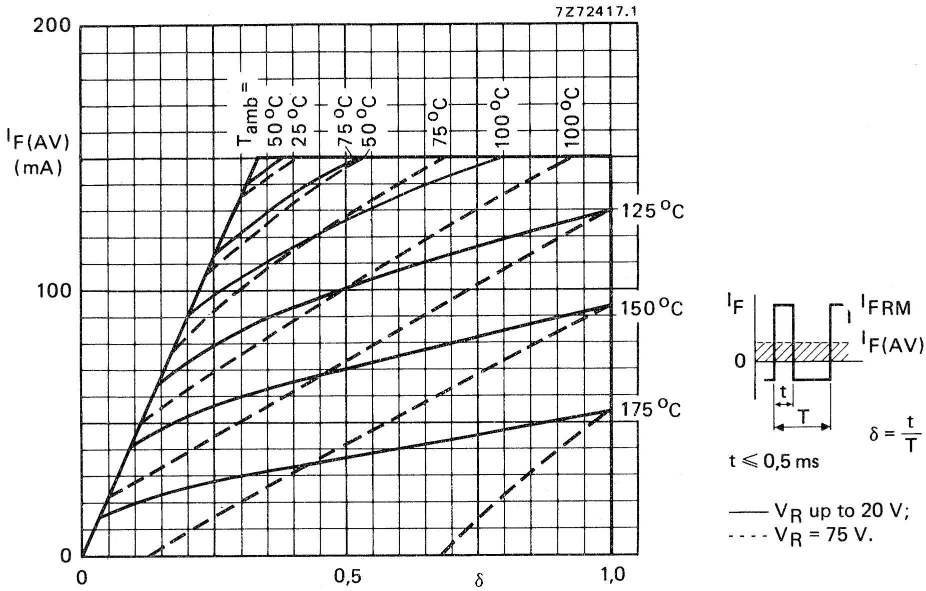


Fig. 4 Maximum permissible average rectified forward current as a function of duty factor (pulse operated).

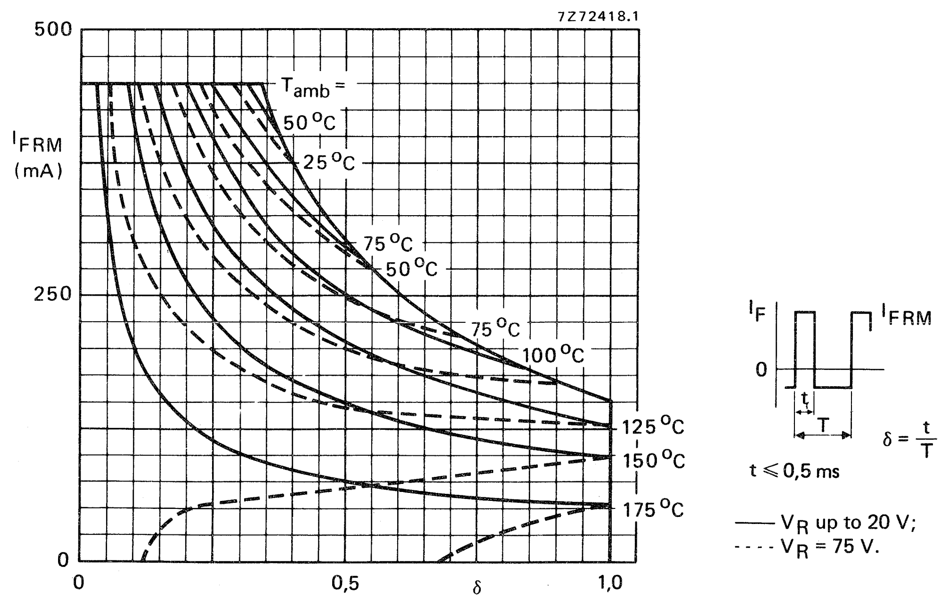


Fig. 5 Maximum permissible repetitive peak forward current as a function of duty factor (pulse operated).

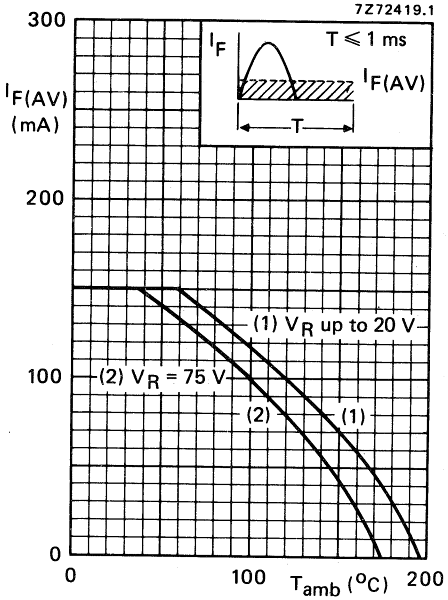


Fig. 6 Maximum permissible average rectified forward current as a function of ambient temperature.

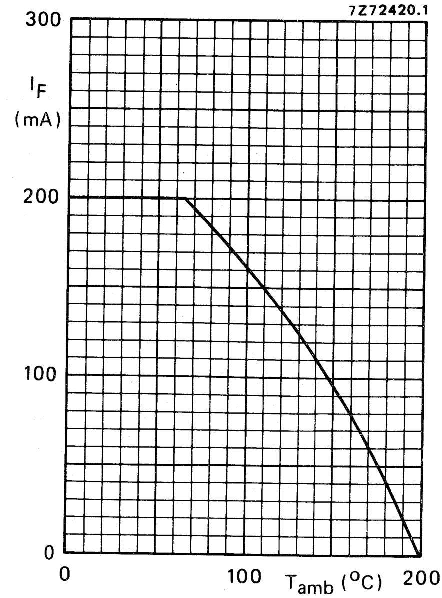


Fig. 7 Maximum permissible continuous forward current as a function of ambient temperature.

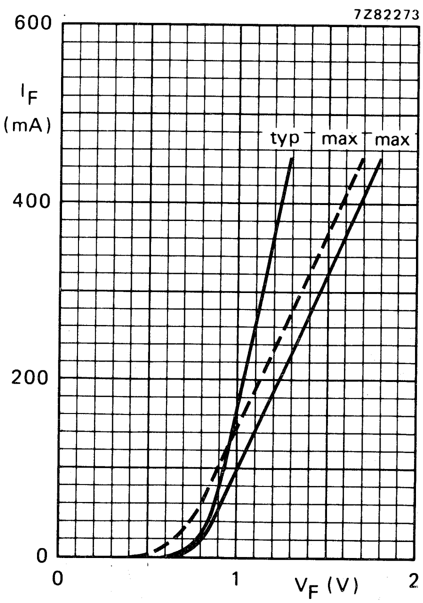


Fig. 8 Forward current as a function of forward voltage; —— T_j = 25 °C; – – – T_j = 175 °C.

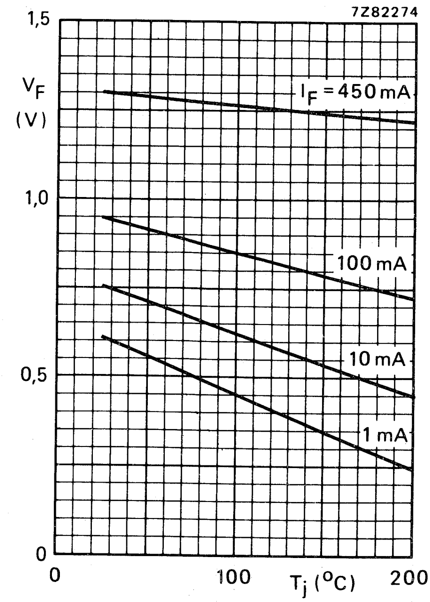


Fig. 9 Forward voltage as a function of junction temperature; typical values.

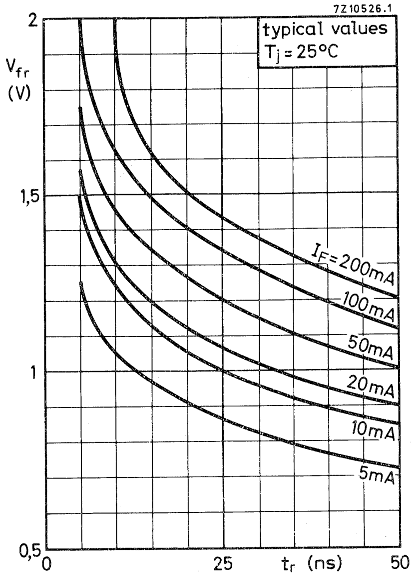


Fig. 10 Forward recovery voltage as a function of rise time.

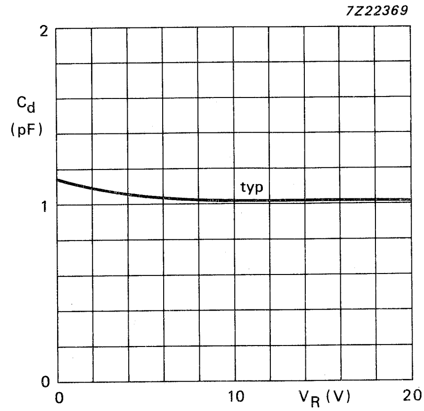


Fig. 11 Diode capacitance as a function of reverse voltage.

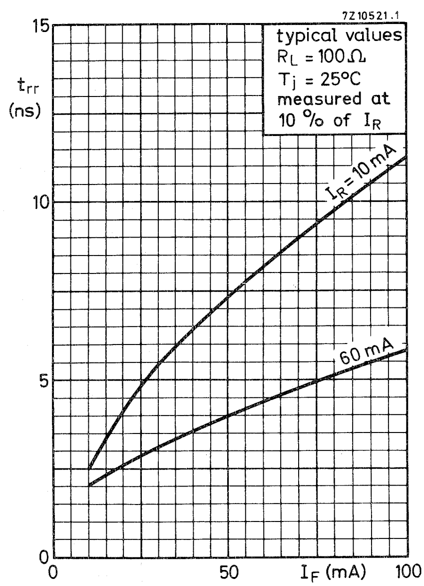


Fig. 12 Reverse recovery time as a function of forward current.

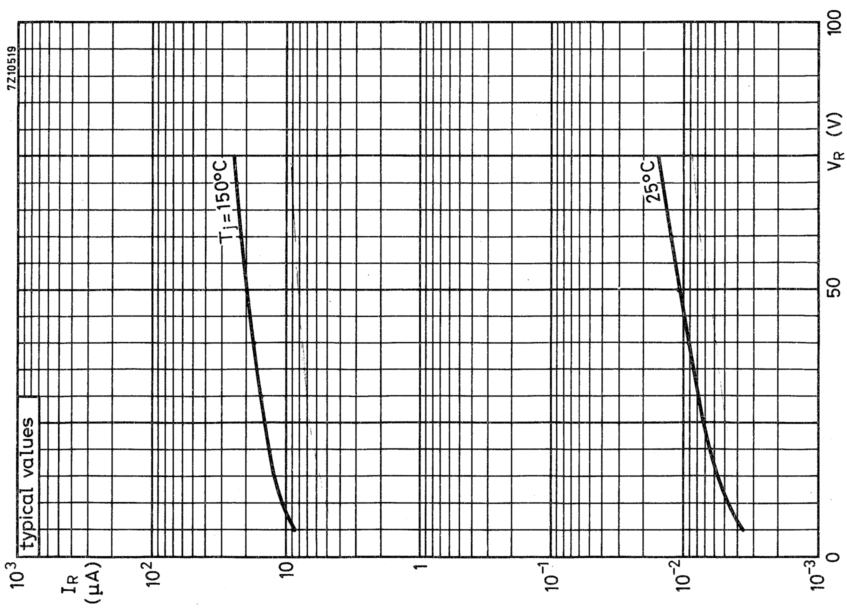


Fig. 13 Reverse current as a function of reverse voltage.

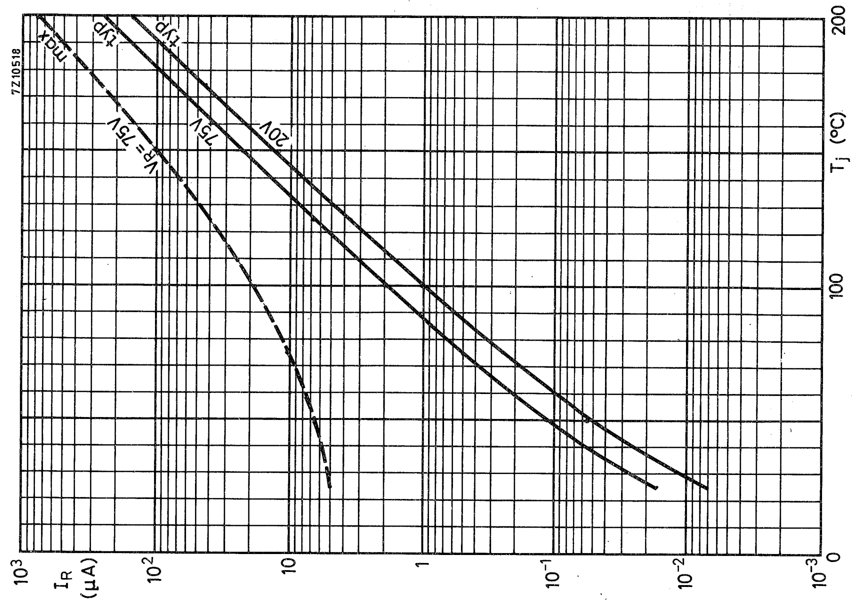


Fig. 14 Reverse current as a function of junction temperature.

LOW LEAKAGE DIODE

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

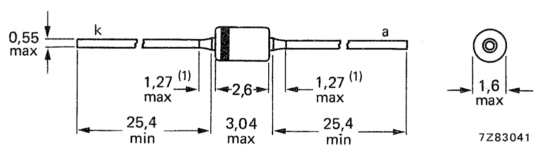
QUICK REFERENCE DATA

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 brown band on a black body.

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 $t_p = 1\ \mu s$	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

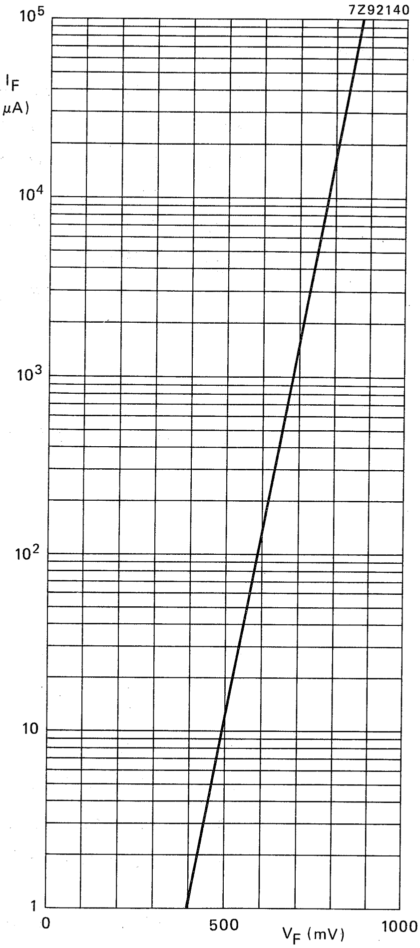


Fig. 2 T_j = 25 °C; typical values.

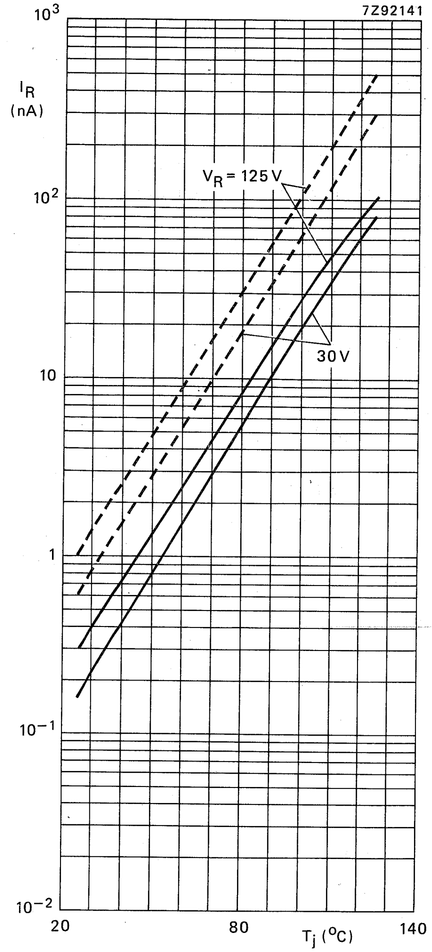


Fig. 3 — — — = max. values;
——— = typ. values.

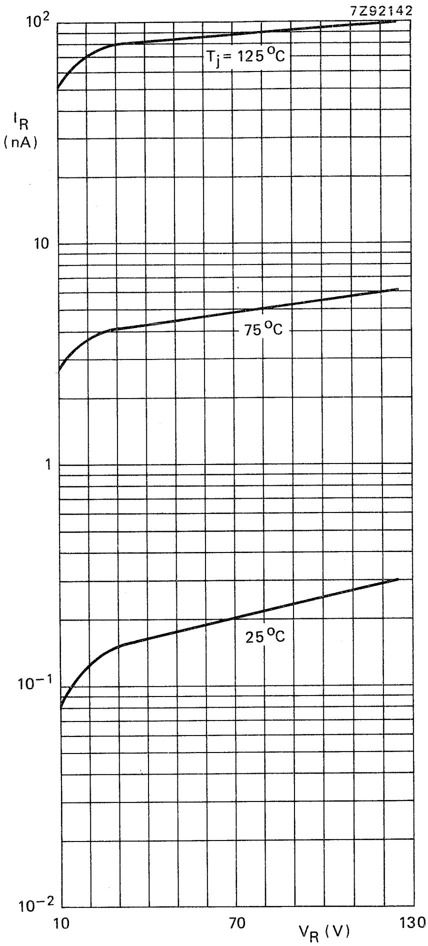


Fig. 4 Typical values.

LOW LEAKAGE DIODE FOR SURFACE MOUNTING

The BAS45L is a switching diode with a very low reverse current.

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

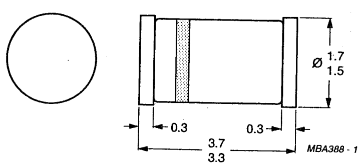
The diodes are delivered in "super 8" tape.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	125 V
Forward voltage I_F = 100 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



The cathode is indicated by a brown band

Fig. 1 SOD-80.

RATINGS

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

Continuous reverse voltage	V_R	max.	125	V
Forward current (DC)	I_F	max.	225	mA
Repetitive peak forward current	I_{FRM}	max.	450	mA
Non-repetitive peak forward current $t_p = 1\ \mu s$	I_{FSM}	max.	4.0	A
Storage temperature range	T_{stg}	−65 to + 175		^oC
Junction temperature	T_j	max.	125	^oC

THERMAL RESISTANCE

From junction to ambient on a ceramic substrate of 8 mm x 10 mm x 0.7 mm (see soldering recommendations SOD-80)	$R_{th\ j\text{-}a}$		400	K/W

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

Reverse current under maximum light conditions (illuminance ⩽ 100 lux) see Fig. 5				
$V_R = 125$ V	I_R	<	1.0	nA
$V_R = 30$ V; $T_j = 125\ ^oC$	I_R	<	300	nA
$V_R = 125$ V; $T_j = 125\ ^oC$	I_R	<	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	<	8.0	pF

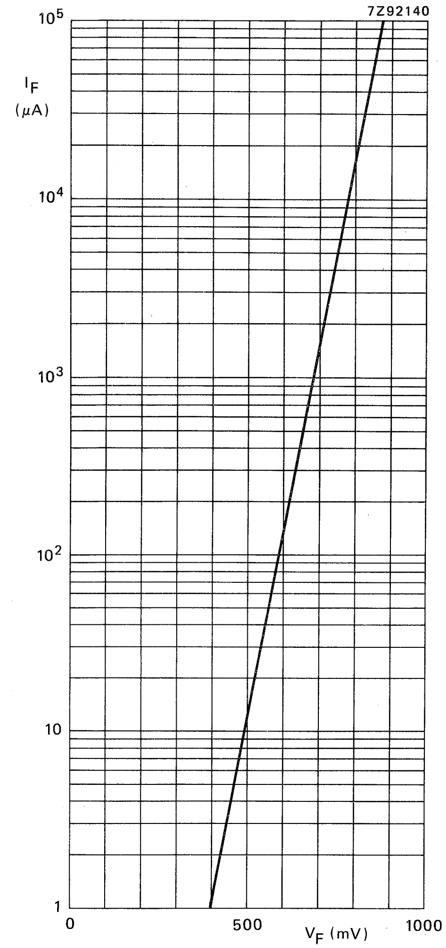


Fig. 2 Forward current as a function of forward voltage; T_j = 25 °C; typical values.

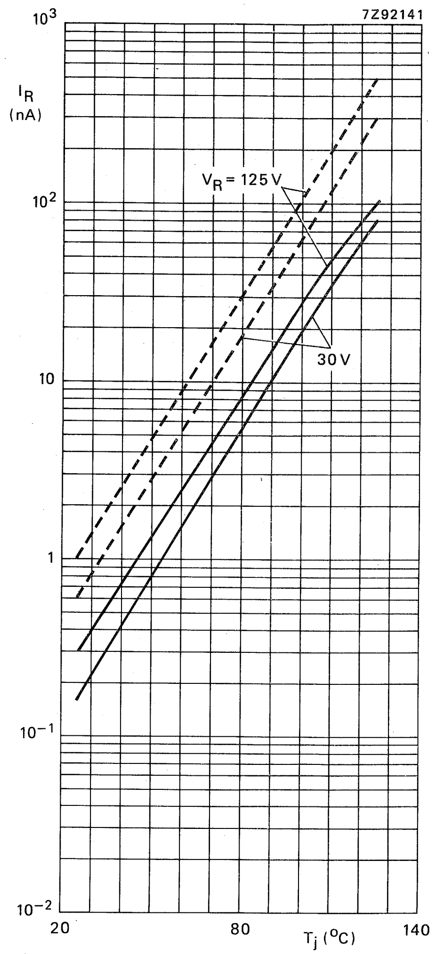


Fig. 3 Reverse current as a function of junction temperature;
— — — = max. values.
——— = typ. values.

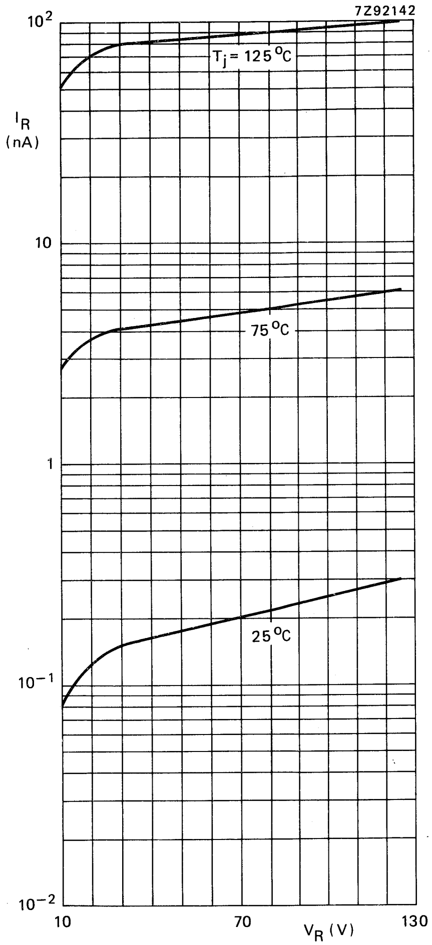


Fig. 4 Reverse current as a function of reverse voltage; typical values.

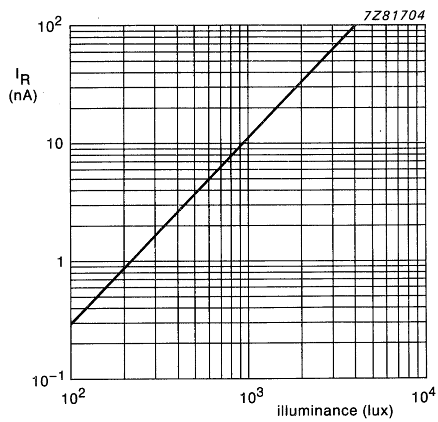


Fig. 5 Reverse current as a function of illuminance; V_R = 125 V; T_{amb} = 25 °C; typical values.

Silicon planar epitaxial high-speed diode

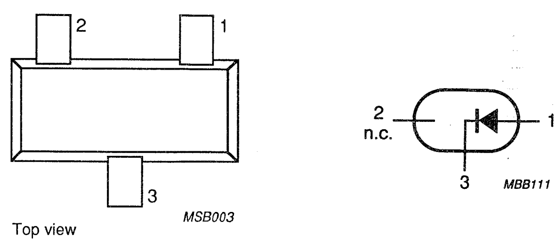
BAS55

DESCRIPTION

Silicon epitaxial high-speed diode in a microminiature plastic envelope. It is intended for high-speed switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		60	V
V_{RRM}	repetitive peak reverse voltage		60	V
I_{FRM}	repetitive peak forward current		600	mA
V_F	forward voltage	I_F = 200 mA	1	V
t_{rr}	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	6	ns
Q_s	reverse recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	50	pC
T_j	junction temperature		150	°C



Marking code: BAS55 = L5p.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	60	V
V_{RRM}	repetitive peak reverse voltage		–	60	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{amb} = 25 °C; note 1	–	200	mA
I_F	forward current	DC value	–	250	mA
I_{FRM}	repetitive peak forward current		–	600	mA
I_{FSM}	non-repetitive peak forward current	t = 1 µs	–	4	A
		t = 1 s	–	1	A
P_{tot}	total power dissipation	mounted on FR4 printboard; T_{amb} = 25 °C	–	250	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	150	°C

Note

1. At $V_R = V_{RR\ max}$; δ = 50%; a = 1.57; ($a = I_{F(RMS)}/I_{F(AV)}$).

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	mounted on FR4 printboard	500 K/W

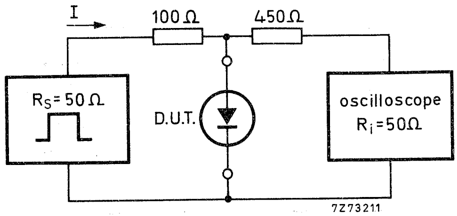
CHARACTERISTICS

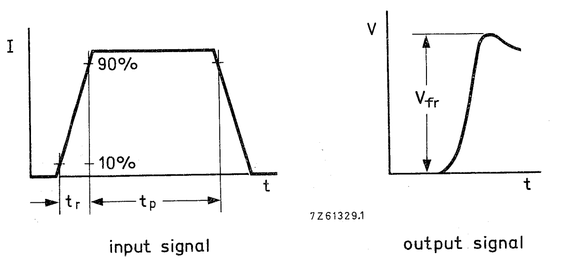
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	DC value; I_F = 200 mA; T_{amb} = 25 °C; note 1	–	1	V
I_R	reverse current	V_R = 60 V	–	100	nA
		V_R = 60 V; T_j = 150 °C	–	100	μA
C_d	diode capacitance	V_R = 0; f = 1 MHz	–	2.5	pF
V_{fr}	forward recovery voltage	when switched to I_F = 400 mA; t_{r1} = 30 ns; see Fig.2	–	2	V
		when switched to I_F = 400 mA; t_{r2} = 100 ns; see Fig.2	–	1.5	V
t_{rr}	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; see Fig.3	–	6	ns
Q_s	reverse recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω; see Fig.4	–	50	pC

Note

1. V_F is measured with diode at thermal equilibrium while mounted on FR4 printboard.



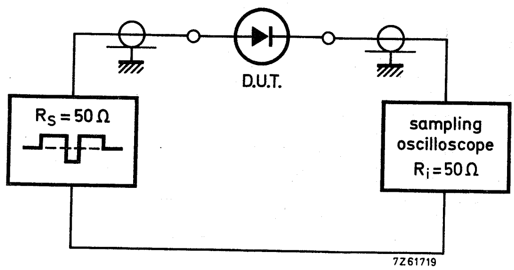


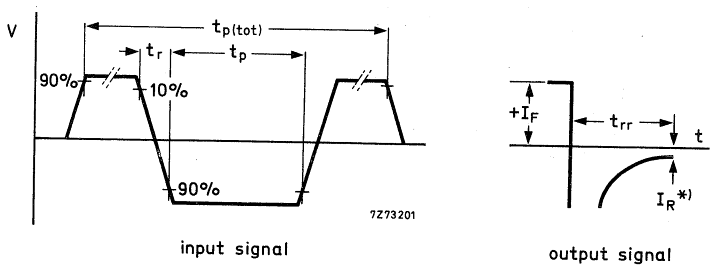
Input signal:
1st rise time of forward pulse (t_{r1}) = 30 ns
2nd rise time of forward pulse (t_{r2}) = 100 ns
forward current pulse duration (t_p) = 300 ns
duty factor (δ) = 0.01.

Oscilloscope:
rise time (t_r) = 0.35 ns
input capacitance (C_i) ≤ 1 pF.

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

Fig.2 Forward recovery voltage test circuit and waveforms.



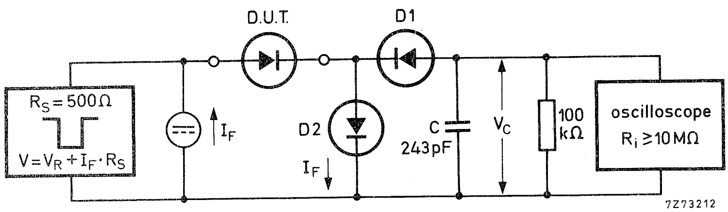


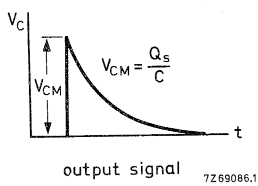
Input signal:
rise time of reverse pulse (t_r) = 0.6 ns
reverse pulse duration (t_p) = 30 ns
duty factor (δ) = 0.0025
total pulse duration ($t_{p(tot)}$) = 0.2 µs.

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

Oscilloscope:
rise time (t_r) = 0.35 ns.

Fig.3 Reverse recovery time test circuit and waveforms.





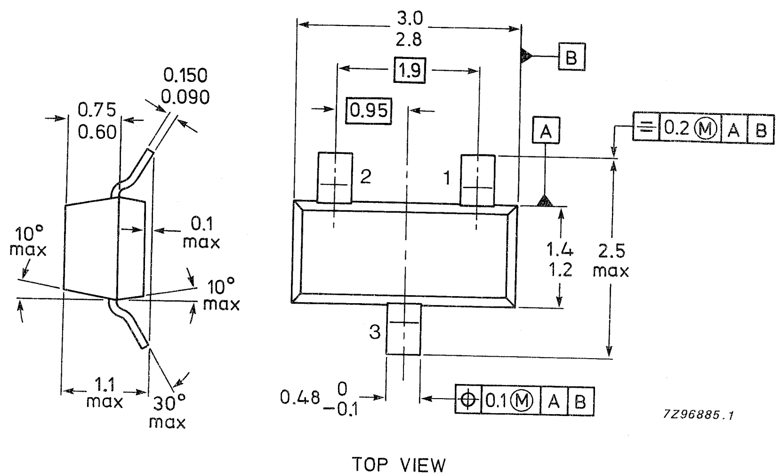
D1 = BAW62
D2 = diode with minority carrier life time (10 mA: < 200 ps).

Input signal:
rise time of 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.4 Recovery charge test circuit and waveforms.

PACKAGE OUTLINE



Dimensions in mm.

Fig.5 SOT23.

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

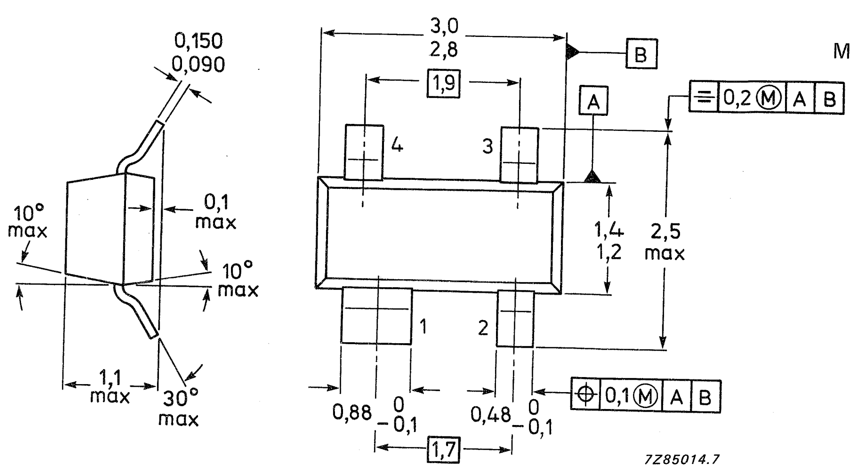
			single diode	series connection	
Continuous reverse voltage	V_R	max.	60	120	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	120	V
Forward current	I_F	max.	200	150	mA
Repetitive peak forward current	I_{FRM}	max.	600	430	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	250		mW
Reverse recovery 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

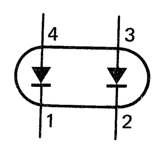
MECHANICAL DATA

Fig. 1 SOT-143.

Dimensions in mm

Marking code: L51





TOP VIEW

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 (per crystal)					
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.	250		mW
Storage temperature range	T_{stg}		−65 to +150		°C
Junction temperature	T_j	max.	150		°C

THERMAL RESISTANCE

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

CHARACTERISTICS, per diode

T_j = 25 °C unless otherwise specified

Forward voltage*				
I_F = 200 mA DC; T_{amb} = 25 °C**	V_F	<	1,00	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

* Mounted on FR-4 printboard.

** Based on thermal equilibrium.

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		<	1,5	V

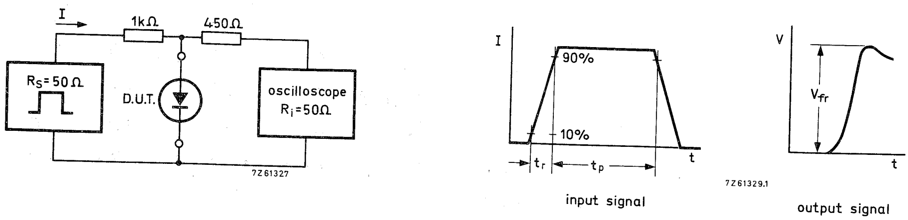


Fig. 2 Test circuit and waveforms; forward recovery voltage.

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

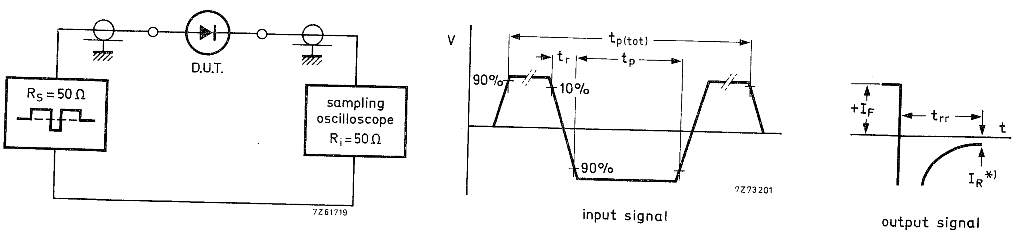


Fig. 3 Test circuits and waveforms; reverse recovery time.

*I_R = 40 mA

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

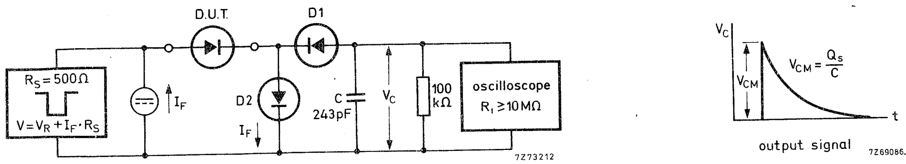


Fig. 4 Test circuit and waveform; recovery charge.

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)

Philips Components

Data sheet	
status	Preliminary specification
date of issue	April 1992

BAS81/82/83
Schottky barrier diodes

DESCRIPTION

General purpose and switching Schottky barrier diodes, with an integrated protection ring against 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.

This surface mounted diode is a packaged in a hermetically sealed SOD80C 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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage			
	BAS81		40	V
	BAS82		50	V
	BAS83		60	V
V_F	forward voltage	I_F = 1 mA	410	mV
I_R	reverse current	$V_R = V_{R\ max.}$	200	nA
I_F	forward current	DC value	30	mA
C_d	diode capacitance		1.6	pF
T_j	junction temperature		150	°C

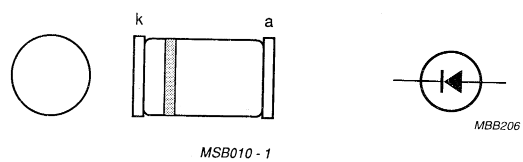


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage				
	BAS81		–	40	V
	BAS82		–	50	V
	BAS83		–	60	V
I_F	forward current	DC value	–	30	mA
I_{FRM}	repetitive peak forward current		–	150	mA
I_{FSM}	non-repetitive forward current	t = 1 s	–	500	mA
T_{stg}	storage temperature range		−65	+150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	NOM.	UNIT
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	320	K/W

Note

1. Device mounted on a 1.5 mm thick epoxy-glass PCB; Cu-thickness 40 µm (see Fig.2).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 0.1 mA I_F = 1 mA I_F = 15 mA	330 410 1	mV mV V
I_R	reverse current	$V_R = V_R$ max.	200	nA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	1.6	pF

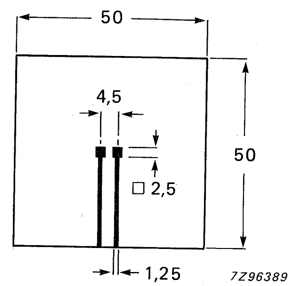


Fig.2 PCB mounting.

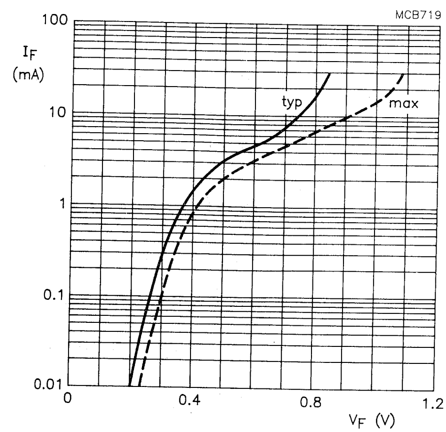


Fig.3 Forward current as a function of forward voltage; T_j = 25 °C.

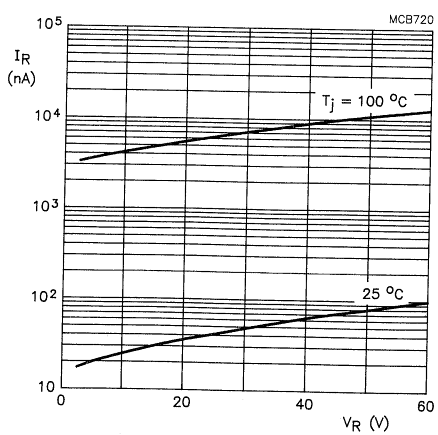


Fig.4 Reverse current as a function of reverse voltage; typical values.

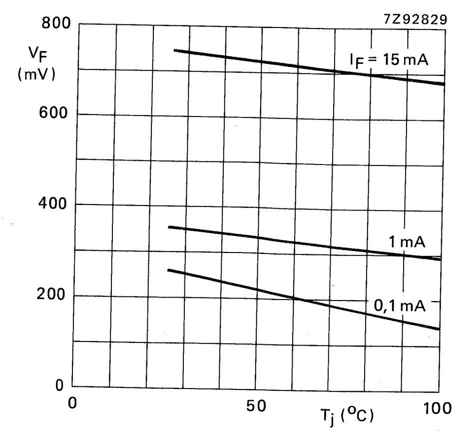


Fig.5 Forward voltage as a function of junction temperature; typical values.

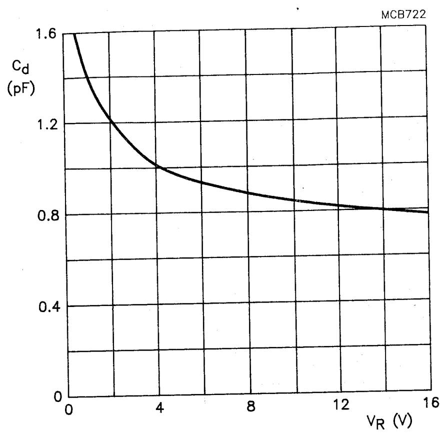


Fig.6 Diode capacitance as a function of reverse voltage; f = 1 MHz; typical values.

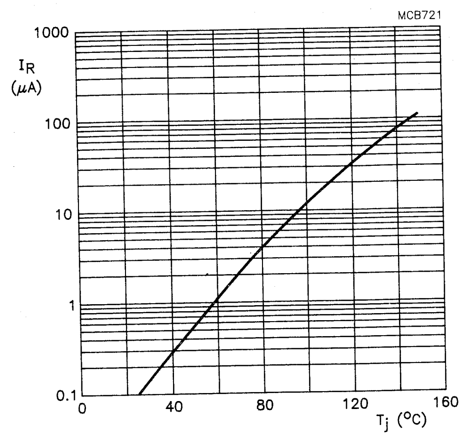
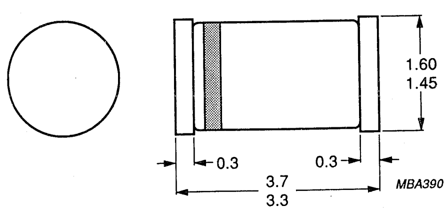


Fig.7 Reverse current as a function of junction temperature; $V_R = V_{R\,max.}$; typical values.

PACKAGE OUTLINE



Dimensions in mm

Cathode indicated by grey band.

Fig.8 SOD80C.

Schottky barrier diode

BAS85

DESCRIPTION

A Schottky barrier diode with an integrated protection ring against static discharges. This diode, in a SOD80C SMD envelope, is intended for applications where a very low forward voltage is required.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		30	V
V_F	forward voltage	I_F = 10 mA	400	mV
I_F	DC forward current		200	mA
I_{FRM}	repetitive peak forward current		300	mA
C_d	diode capacitance		10	pF
T_j	junction temperature		125	°C

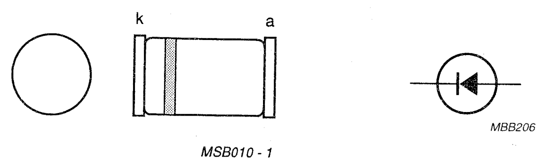


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_F	DC forward current		–	200	mA
I_{FRM}	repetitive peak forward current		–	300	mA
I_{FSM}	non-repetitive peak forward current	$t_p \leq 10$ ms	–	5	A
$I_{F(AV)}$	average rectified forward current	see note 1 and Fig.2	–	200	mA
T_j	junction temperature		–	125	°C
T_{amb}	operating ambient temperature range		–40	125	°C
T_{stg}	storage temperature range		–65	150	°C

Note

1. PCB mounting (see note under 'Thermal Resistance'); $T_{amb} = 50$ °C; $V_{RWM} = 25$ V; a = 1.57; $\delta = 0.5$.

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$ (note 1)	from junction to ambient	320 K/W

Note

1. PCB mounting with 1.5 mm epoxy glass; 6.25 mm^2 copper each terminal; thickness of copper minimum 40 µm.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	$I_F = 0.1$ mA	240	mV
		$I_F = 1$ mA	320	mV
		$I_F = 10$ mA	400	mV
		$I_F = 30$ mA	500	mV
		$I_F = 100$ mA	800	mV
I_R	reverse current	$V_R = V_{R\ max}$	2.3	µA
C_d	diode capacitance	$V_R = 1$ V; f = 1 MHz	10	pF

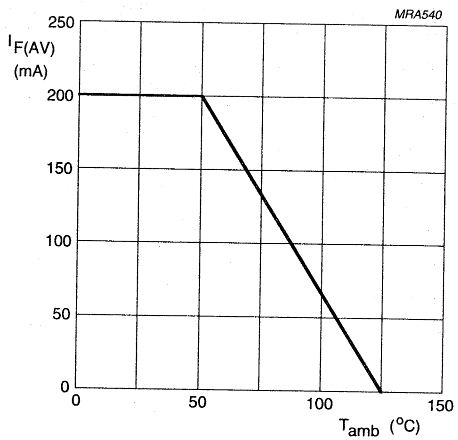


Fig.2 Derating curve.

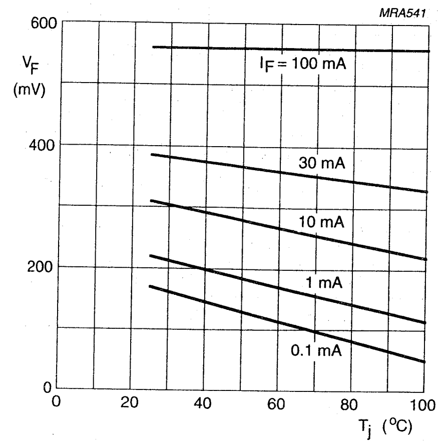
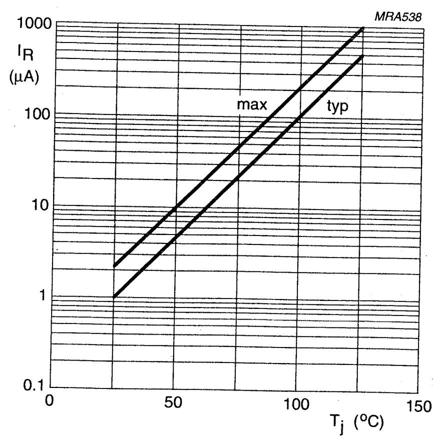
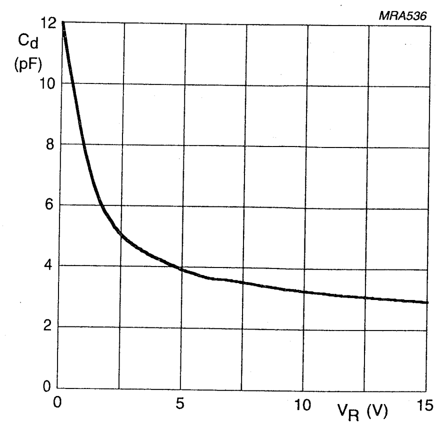


Fig.3 Forward voltage as a function of junction temperature, typical values.



$V_R = V_{R\ max}$.

Fig.4 Reverse current as a function of junction temperature.



f = 1 MHz.

Fig.5 Diode capacitance as a function of reverse voltage, typical values.

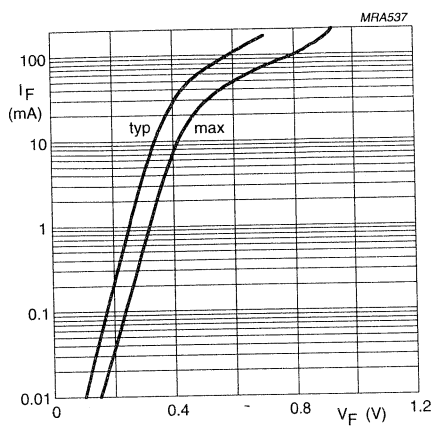


Fig.6 Forward current as a function of forward voltage.

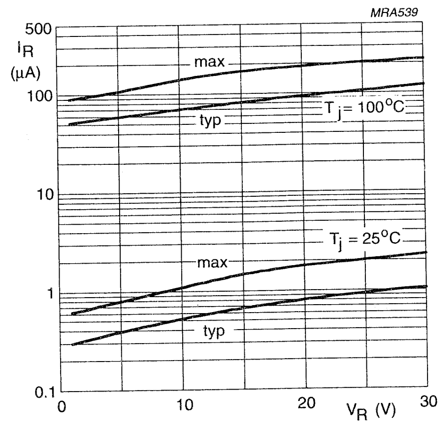
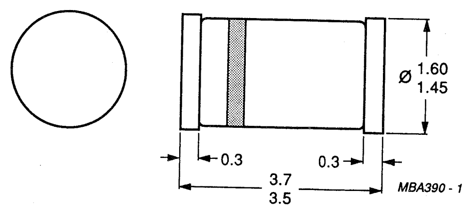


Fig.7 Reverse current as a function of reverse voltage.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a grey band.

Fig.8 SOD80C.

SCHOTTKY BARRIER DIODE

Schottky Barrier diode with an integrated protection ring against extremely high static discharges. This diode, in a SOD80C envelope, is intended for applications where a very low forward voltage is required.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	50	V
Forward current (DC)	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	max.	450	mV
Diode capacitance	C_d	max.	8	pF

MECHANICAL DATA

Dimensions in mm

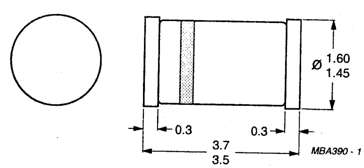


Fig.1 SOD80C.

The cathode is indicated by grey band

RATINGS

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

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

THERMAL RESISTANCE

Device mounted on a 1.5 mm thick epoxy-glass PCB	$R_{th\ j\text{-}a}$	=	320	K/W

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

Forward voltage				
I_F = 0.1 mA	V_F	max.	300	mV
I_F = 1 mA		max.	380	mV
I_F = 10 mA	V_F	max.	450	mV
I_F = 30 mA		max.	600	mV
I_F = 100 mA	V_F	typ.	600	mV
		max.	900	mV
Reverse current V_R = 40 V	I_R	max.	5	μA
Reverse breakdown voltage I_R = 10 μA	$V_{(BR)R}$	min.	50	V
Diode capacitance V_R = 1 V; f = 1 MHz	C_d	max.	8	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}	max.	4	ns

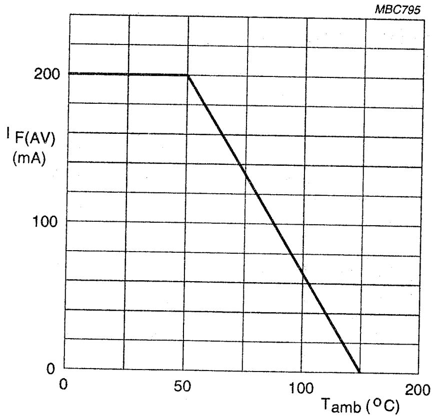


Fig. 2 Derating curve.

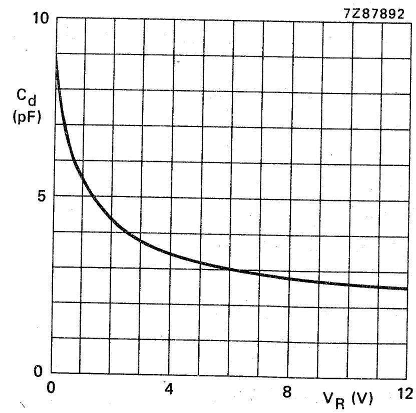


Fig. 3 f = 1 MHz; typ. values.

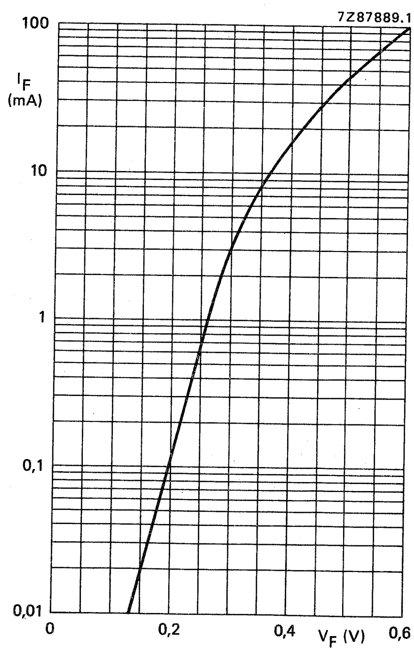


Fig. 4 Typical values.

Silicon planar epitaxial high-speed diode

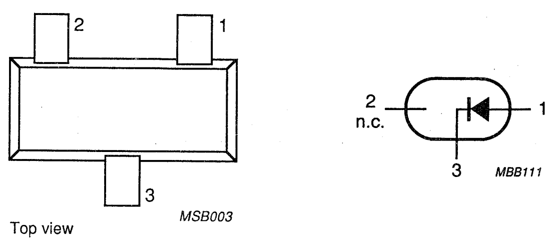
BAS678

DESCRIPTION

Silicon epitaxial high-speed diode in a microminiature plastic envelope. It is intended for high-speed switching applications.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		80	V
V_{RRM}	repetitive peak reverse voltage		100	V
I_{FRM}	repetitive peak forward current		600	mA
V_F	forward voltage	I_F = 200 mA	1	V
t_{rr}	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	6	ns
Q_s	reverse recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω	50	pC
T_j	junction temperature		150	°C



Marking code: BAS678 = L52.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	80	V
V_{RRM}	repetitive peak reverse voltage		–	100	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{amb} = 25 °C; note 1	–	200	mA
I_F	forward current	DC value	–	250	mA
I_{FRM}	repetitive peak forward current		–	600	mA
I_{FSM}	non-repetitive peak forward current	t = 1 µs	–	4	A
		t = 1 s	–	1	A
P_{tot}	total power dissipation	mounted on FR4 printboard	–	250	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction operating temperature		–	150	°C

Note

1. At $V_R = V_{RR\ max}$; δ = 50%; a = 1.57; (a = $I_{F(RMS)}/I_{F(AV)}$).

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	mounted on FR4 printboard	500 K/W

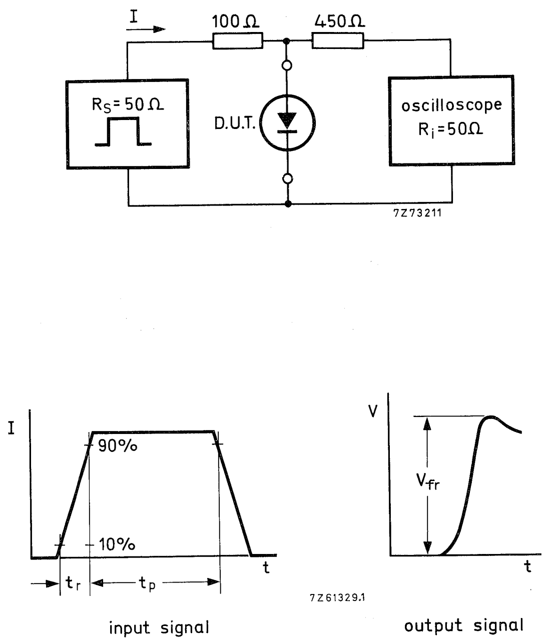
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA	100	–	V
V_F	forward voltage	DC value; I_F = 200 mA; T_{amb} = 25 °C; note 1	–	1	V
I_R	reverse current	V_R = 10 V	–	15	nA
		V_R = 75 V	–	100	nA
		V_R = 75 V; T_j = 150 °C	–	50	µA
C_d	diode capacitance	V_R = 0; f = 1 MHz	–	2	pF
V_{fr}	forward recovery voltage	when switched to I_F = 10 mA; t_p = 20 ns; see Fig.2	–	2	V
t_{rr}	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; see Fig.3	–	6	ns
Q_s	reverse recovery charge	when switched from I_F = 10 mA to V_R = 5 V; R_L = 500 Ω; see Fig.4	–	50	pC

Note

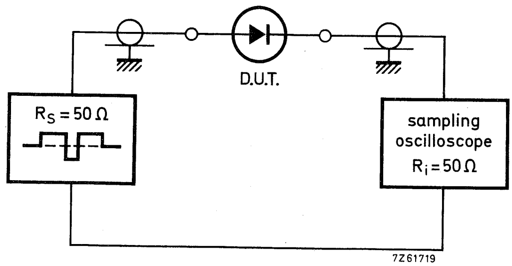
1. V_F is measured with diode at thermal equilibrium while mounted on FR4 printboard.

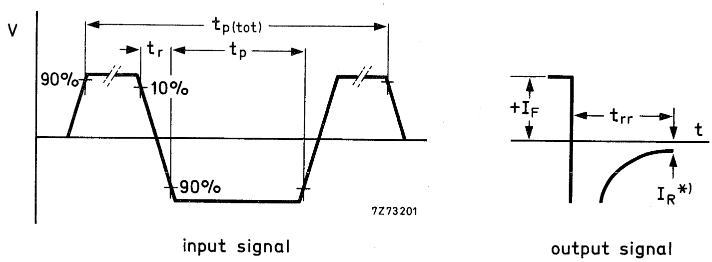


Input signal:
forward pulse rise time (t_r) = 20 ns
forward current pulse duration (t_p) = 120 ns
duty factor (δ) = 0.01.

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

Fig.2 Forward recovery voltage test circuit and waveforms.



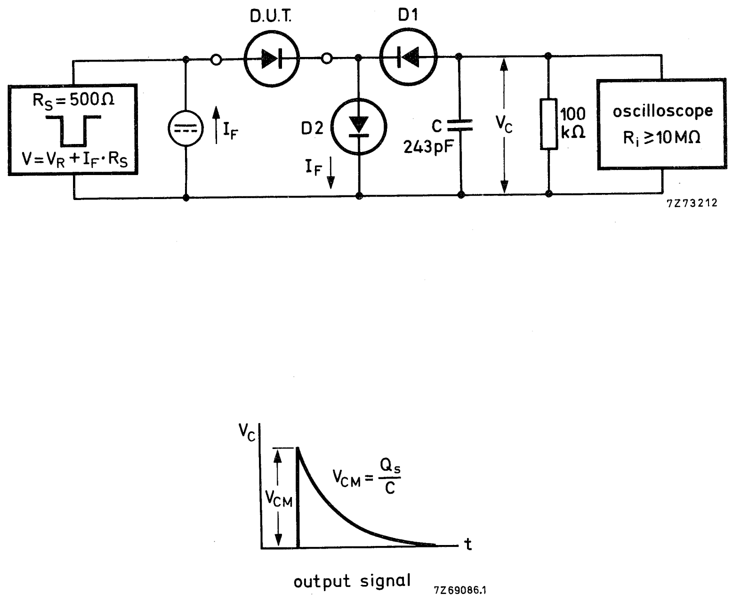


Input signal:
rise time of reverse pulse (t_r) = 0.6 ns
reverse pulse duration (t_p) = 30 ns
duty factor (δ) = 0.0025
total pulse duration ($t_{p(tot)}$) = 0.2 µs.

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

Oscilloscope:
rise time (t_r) = 0.35 ns.

Fig.3 Reverse recovery time test circuit and waveforms.



D1 = BAW62

D2 = diode with minority carrier life time (10 mA: < 200 ps).

Input signal:

rise time of reverse pulse (t_r) = 2 ns

reverse pulse duration (t_p) = 400 ns

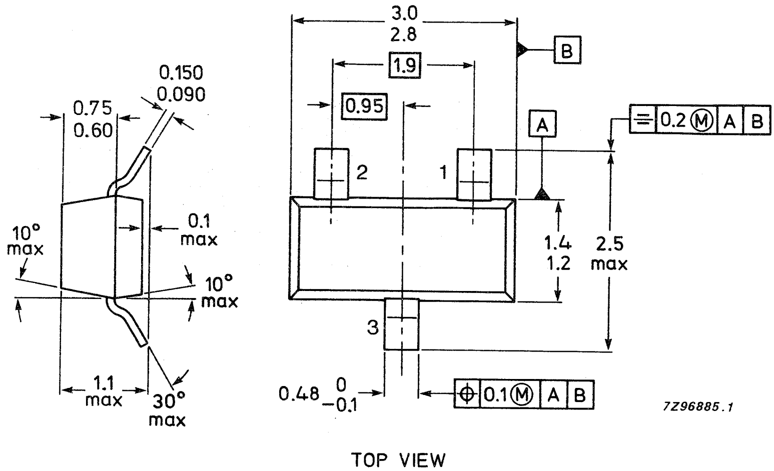
duty factor (δ) = 0.02.

Circuit capacitance:

$C \leq 7$ pF (C = oscilloscope input capacitance + parasitic capacitance).

Fig.4 Recovery charge test circuit and waveforms.

PACKAGE OUTLINE



Dimensions in mm.

Fig.5 SOT23.

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

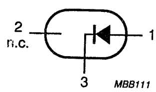
MECHANICAL DATA

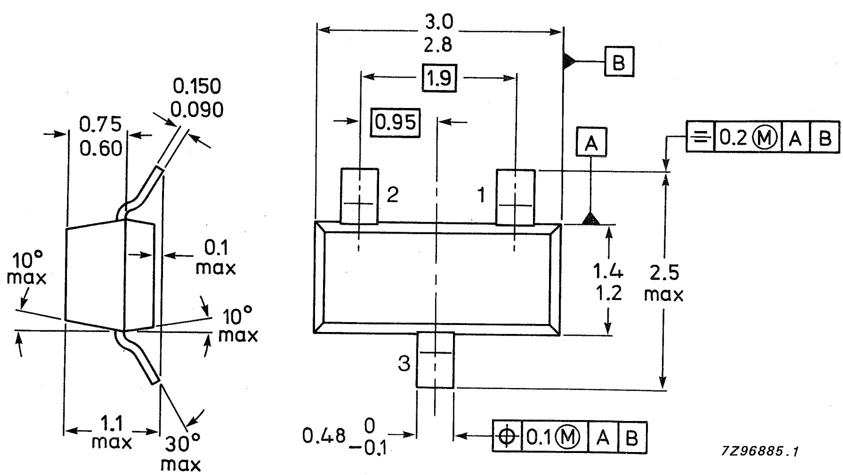
Dimensions in mm

Marking code

BAT17 = A3p

Fig.1 SOT-23.





TOP VIEW

Product approved to CECC 50 001-062.

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 RESISTANCE*

From junction to ambient**	$R_{th\ j\text{-}a}$	=	430	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 8 mm x 10 mm x 0,7 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.

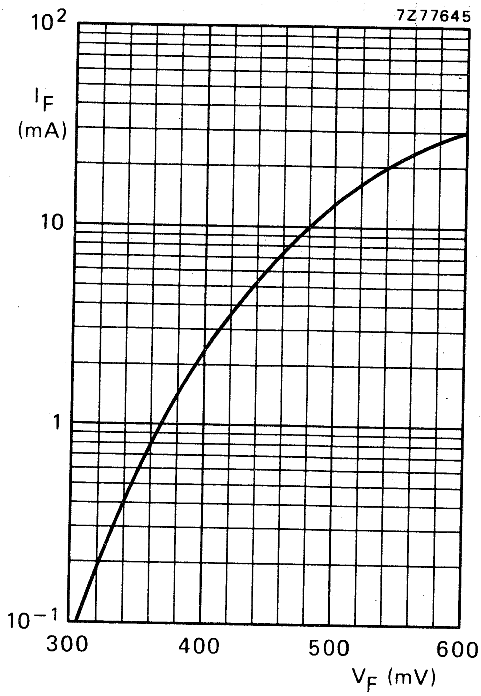


Fig. 2 Typical values.

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 pF 1,0 pF
Series resistance at f = 200 MHz I_F = 5 mA	r_D	typ. <	0,5 Ω 0,7 Ω

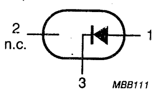
MECHANICAL DATA

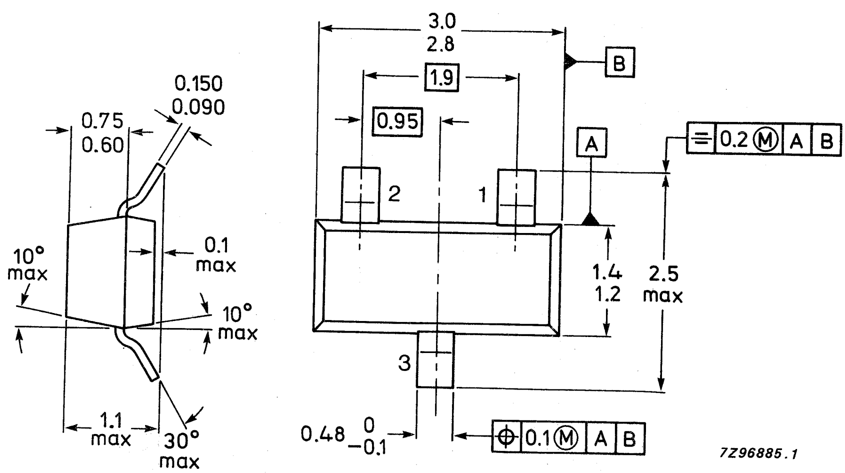
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAT18 = A2





TOP VIEW

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 RESISTANCE*

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

CHARACTERISTICS

T_j = 25 °C 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 °C	I_R	<	1	μA
Diode capacitance at f = 1 MHz		typ.	0,8	pF
V_R = 20 V	C_d	<	1,0	pF
Series resistance at f = 200 MHz		typ.	0,5	Ω
I_F = 5 mA	r_D	<	0,7	Ω

* See *Thermal characteristics.*
** Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

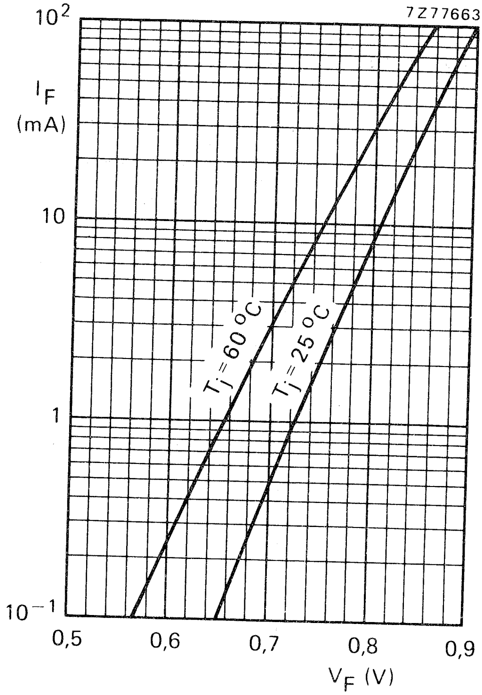


Fig. 2 Typical values.

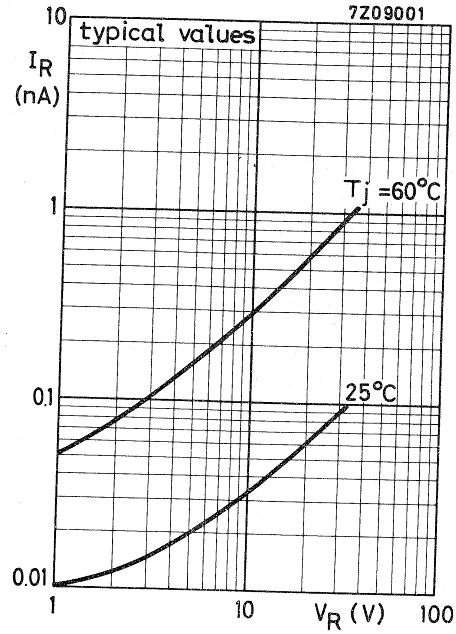


Fig. 3.

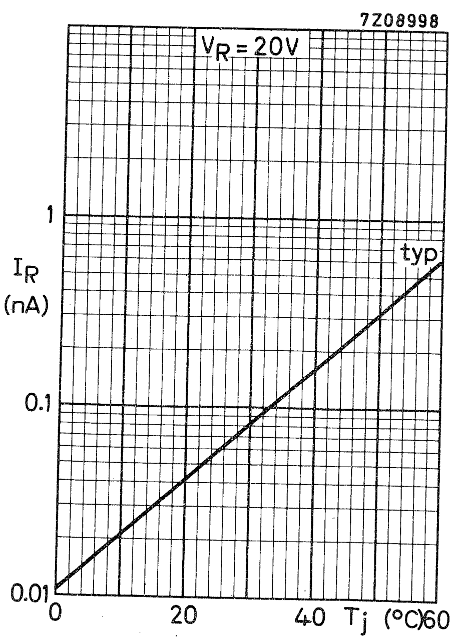


Fig. 4.

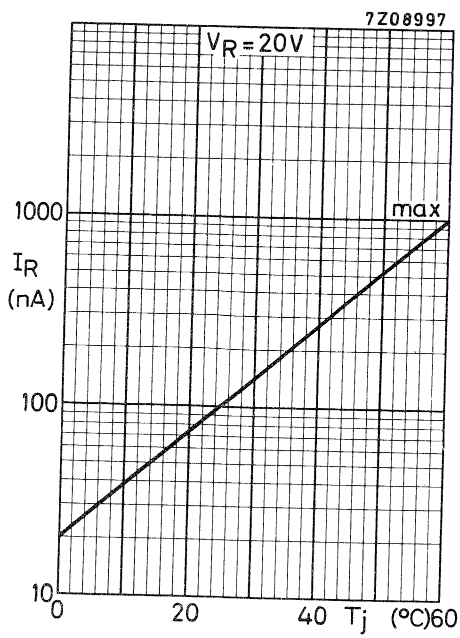


Fig. 5.

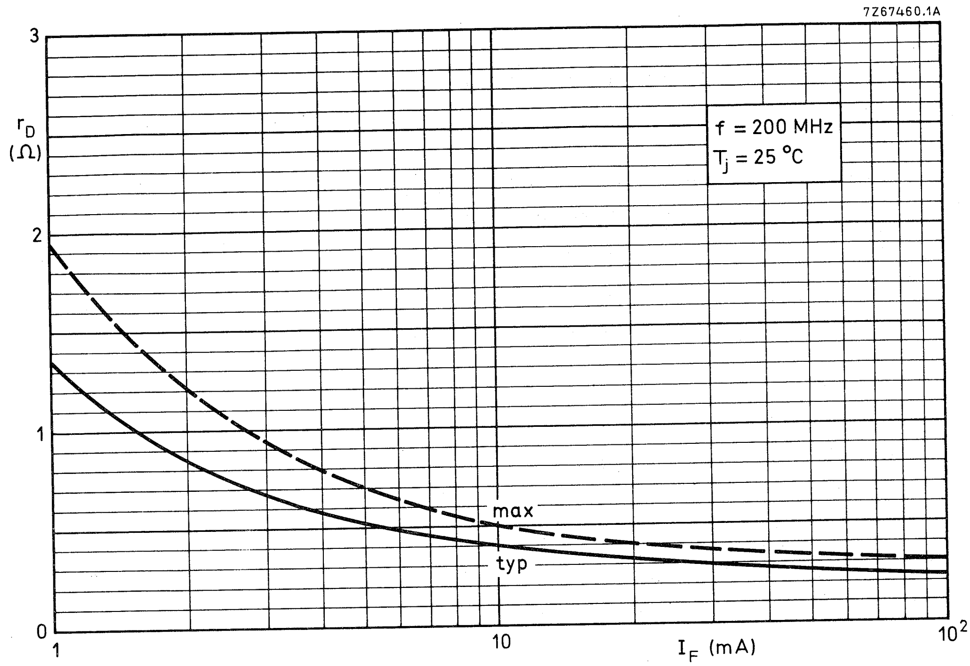


Fig. 6.

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.

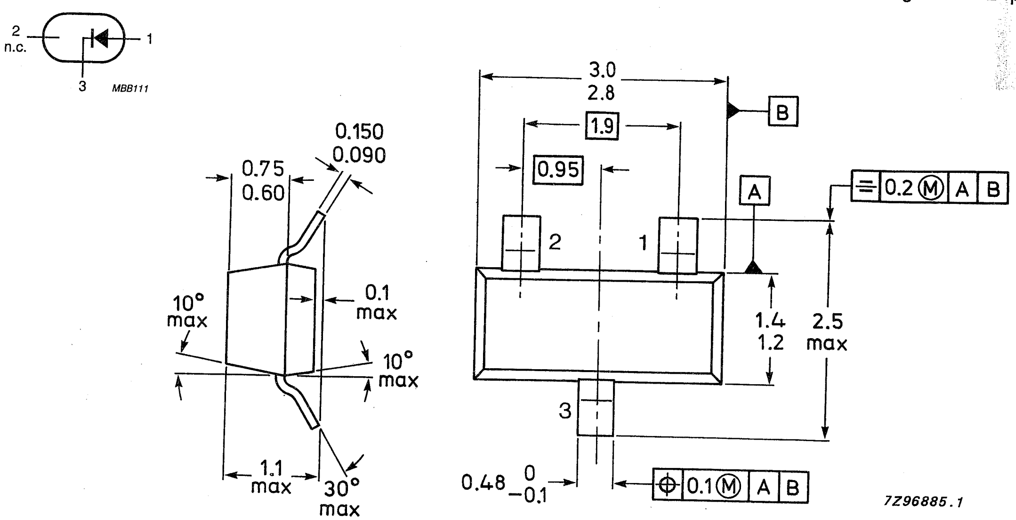
QUICK REFERENCE DATA

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: L4p



TOP VIEW

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

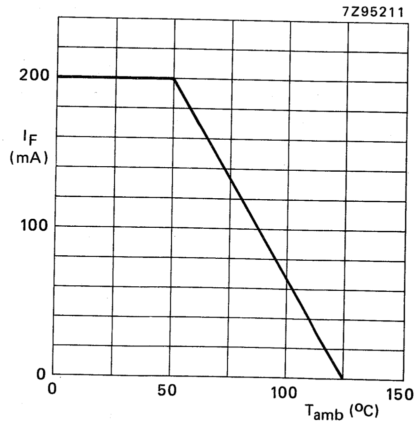


Fig. 2 Derating curve maximum ambient temperature.

SCHOTTKY BARRIER DIODE

Silicon epitaxial Schottky Barrier double diodes with an integrated p-n junction protection ring in a microminiature SOT-23 envelope intended for surface mounting.

The diodes feature an especially low forward voltage.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30	V
Forward current (DC)	I_F	max.	200	mA
Forward voltage at I_F = 10 mA	V_F	max.	400	mV
Reverse recovery time when switched from I_F = 10 mA to I_R = 10 mA; R_L = 100; measured at I_R = 1 mA	t_{rr}	<	5	ns
Junction temperature	T_j	max.	125	°C

Dimensions in mm

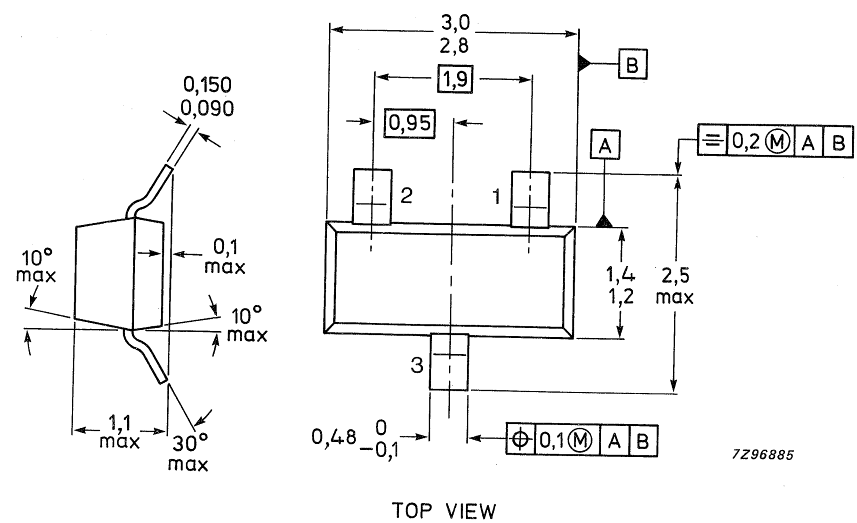
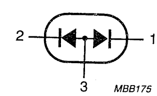
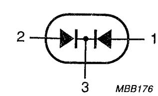


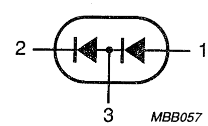
Fig. 1 SOT-23.



BAT54A
Marking code: L42



BAT54C
Marking code: L43



BAT54S
Marking code: L44

RATINGS

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

Repetitive peak reverse voltage	V_{RRM}	max.	30 V
Forward current (DC)	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
Storage temperature	T_{stg}	−50 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	max.	240 mV
I_F = 1 mA	V_F	max.	320 mV
I_F = 10 mA	V_F	max.	400 mV
I_F = 30 mA	V_F	max.	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	$V_{(BR)R}$	>	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; measured at I_R = 1 mA	t_{rr}	<	5 ns

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.

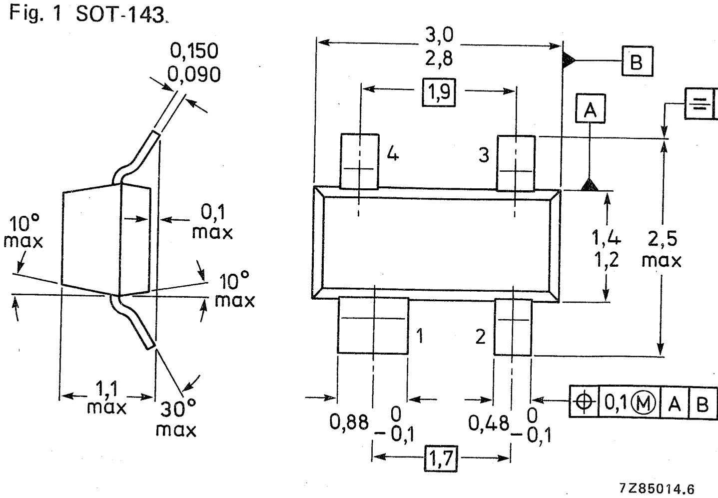
QUICK REFERENCE DATA

			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

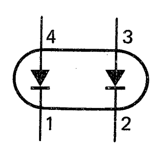
Dimensions in mm

Fig. 1 SOT-143.



TOP VIEW

Marking code : L41



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.

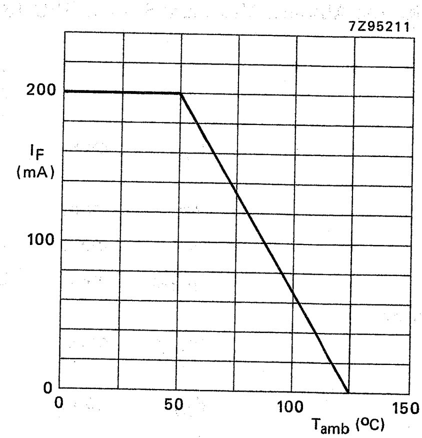


Fig. 2 Derating curve maximum ambient temperature.

DESCRIPTION

General purpose and switching Schottky barrier diodes in a SOD68 envelope, with an integrated protection ring against 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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage			
	BAT81		40	V
	BAT82		50	V
	BAT83		60	V
V_F	forward voltage	$I_F = 1$ mA	410	mV
I_R	reverse current	$V_R = V_{R\ max}$	200	nA
I_F	forward current	DC value	30	mA
C_d	diode capacitance		1.6	pF
T_j	junction temperature		200	°C

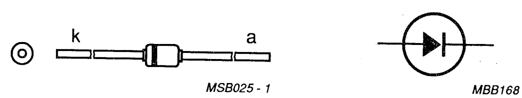


Fig.1 Simplified outline (SOD68) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage				
	BAT81		–	40	V
	BAT82		–	50	V
	BAT83		–	60	V
I_F	forward current	DC value	–	30	mA
I_{FRM}	repetitive peak forward current	$t_p < 1$ s; $\delta \leq 0.5$ (note 1)	–	150	mA
I_{FSM}	non-repetitive peak forward current	t = 10 ms	–	500	mA
T_{stg}	storage temperature range		−65	200	°C
T_j	junction temperature		–	200	°C

Note

1. δ = data cycle.

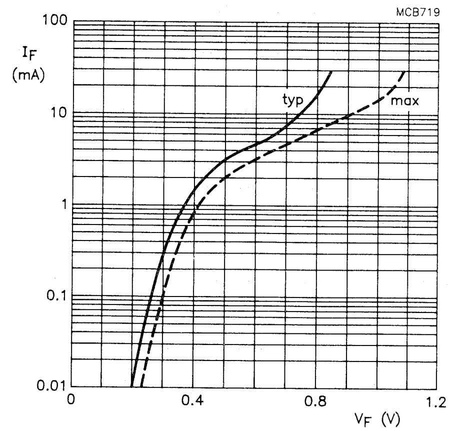
THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	320 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 0.1 mA	330	mV
		I_F = 1 mA	410	mV
		I_F = 15 mA	1	V
I_R	reverse current	$V_R = V_{R\ max}$	200	nA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	1.6	pF



T_j = 25 °C.

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

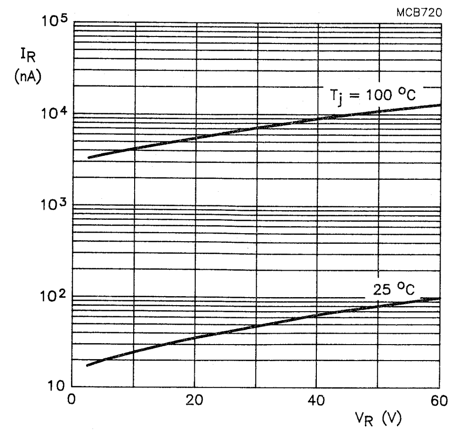


Fig.3 Reverse current as a function of reverse voltage, typical values.

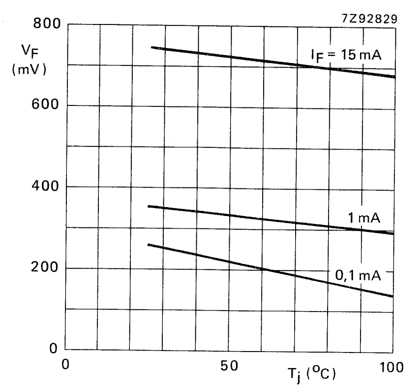
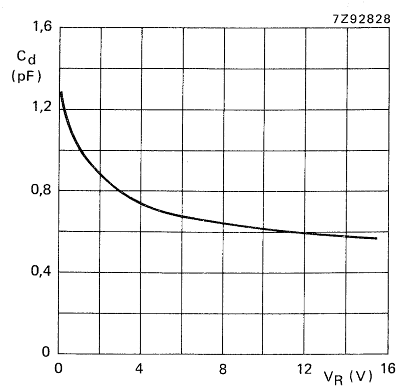
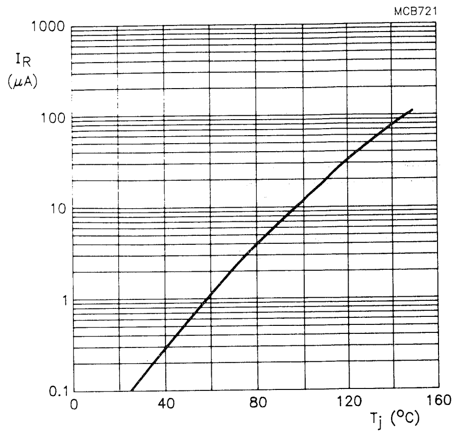


Fig.4 Forward voltage as a function of junction temperature, typical values.



f = 1 MHz.

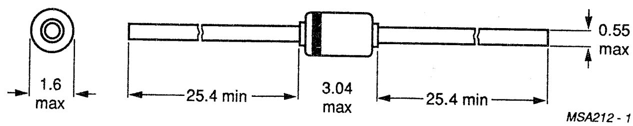
Fig.5 Diode capacitance as a function of reverse voltage, typical values.



$V_R = V_{R\,max}$.

Fig.6 Reverse current as a function of junction temperature, typical values.

PACKAGE OUTLINE



Dimensions in mm.

Cathode indicated by coloured band.

The diodes are type branded.

Fig.7 SOD68 (DO-34).

DESCRIPTION

A Schottky barrier diode with an integrated protection ring against static discharges. This diode, in a SOD68 (DO-34) envelope, is intended for applications where a very low forward voltage is required.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage		30	V
V_F	forward voltage	I_F = 10 mA	400	mV
I_F	DC forward current		200	mA
I_{FRM}	repetitive peak forward current		300	mA
C_d	diode capacitance		10	pF
T_j	junction temperature		125	°C

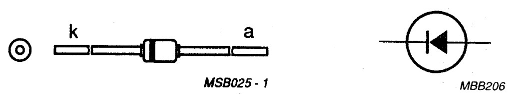


Fig.1 Simplified outline and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_F	DC forward current		–	200	mA
I_{FRM}	repetitive peak forward current		–	300	mA
I_{FSM}	non-repetitive peak forward current	$t_p \leq 10$ ms	–	5	A
$I_{F(AV)}$	average rectified forward current	see note 1 and Fig.2	–	200	mA
T_j	junction temperature		–	125	°C
T_{amb}	operating ambient temperature range		−40	125	°C
T_{stg}	storage temperature range		−65	150	°C

Note

1. PCB mounting (see note under 'Thermal Resistance'); T_{amb} = 50 °C; V_{RWM} = 25 V; a = 1.57; δ = 0.5.

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$ (note 1)	from junction to ambient	320 K/W

Note

1. Mounted on a printed circuit board at a lead length of 4 mm.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 0.1 mA	240	mV
		I_F = 1 mA	320	mV
		I_F = 10 mA	400	mV
		I_F = 30 mA	500	mV
		I_F = 100 mA	800	mV
I_R	reverse current	$V_R = V_{R\ max}$	2	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	10	pF

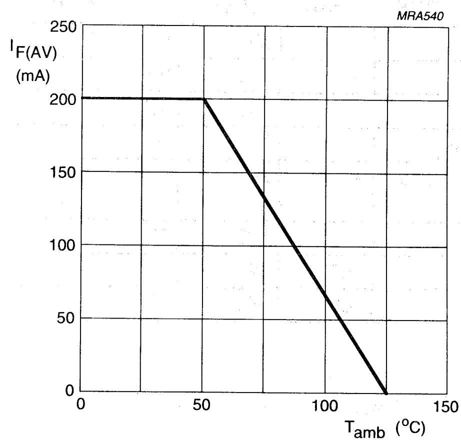


Fig.2 Derating curve.

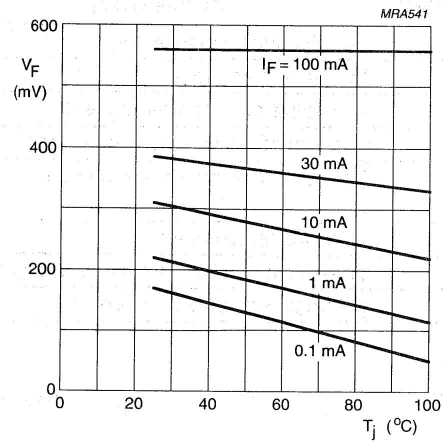
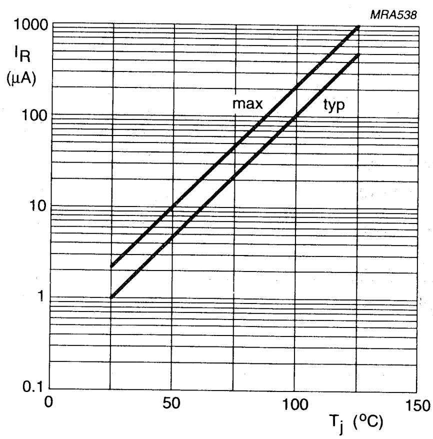
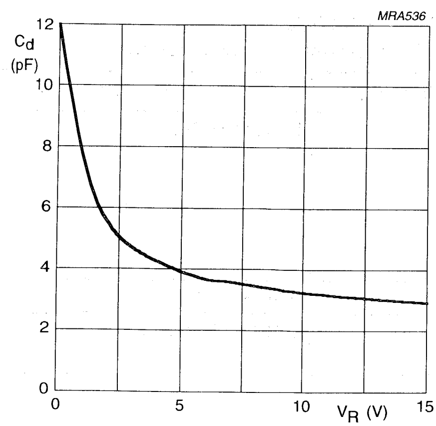


Fig.3 Forward voltage as a function of junction temperature, typical values.



$V_R = V_{R\ max}$.

Fig.4 Reverse current as a function of junction temperature.



f = 1 MHz.

Fig.5 Diode capacitance as a function of reverse voltage, typical values.

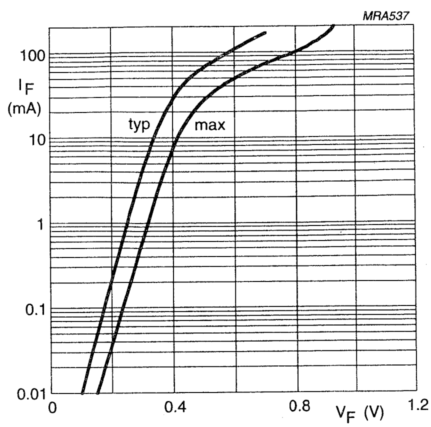


Fig.6 Forward current as a function of forward voltage.

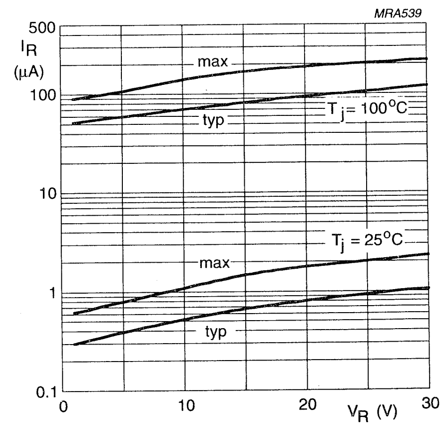
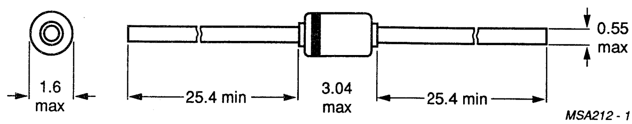


Fig.7 Reverse current as a function of reverse voltage.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

The diodes are type branded.

Fig.8 SOD68 (DO-34).

SCHOTTKY BARRIER DIODE

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

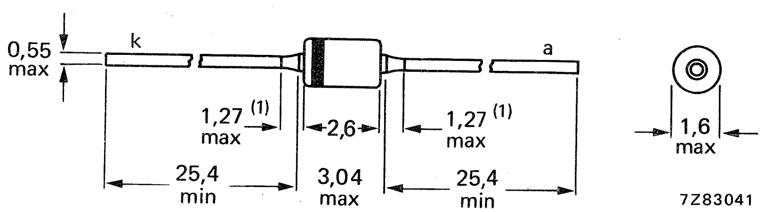
QUICK REFERENCE DATA

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	<	450	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 marking band indicates the cathode.
The diodes are type branded.

Products, approved to CECC 50 001-075.

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

$T_j = 25$ °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.	900	mV
Reverse current $V_R = 40$ V	I_R	<	5	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

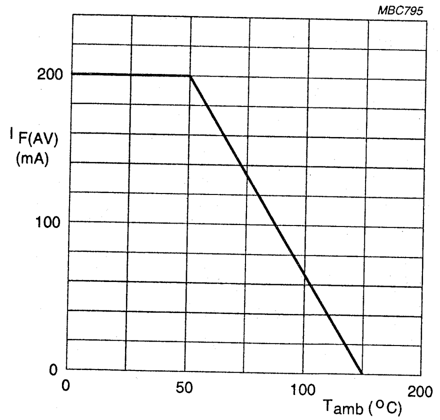


Fig. 2 Derating curve.

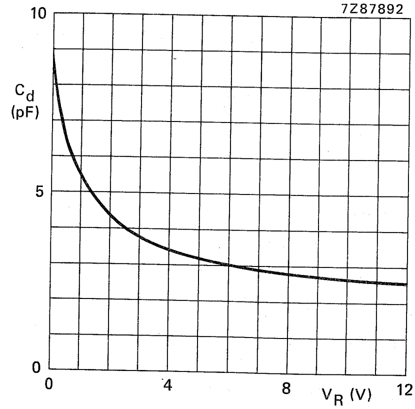


Fig. 3 f = 1 MHz; typ. values.

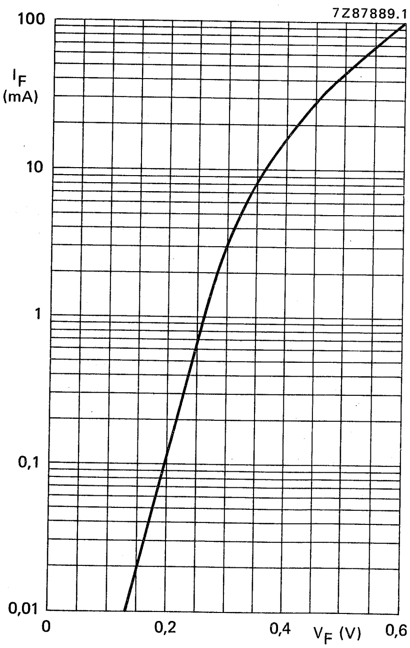


Fig. 4 Typical values.

ULTRA-HIGH-SPEED DIODES

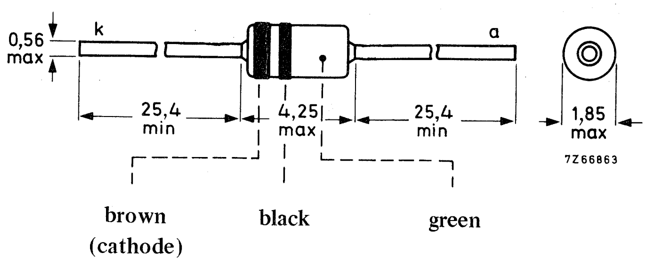
Silicon planar epitaxial, ultra-high-speed, high-conductance diode in a DO-35 envelope. The BAV10 is primarily intended for core gating in very fast memories.

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 (SOD27).



Diodes may be type-branded or colour-coded

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

Continuous reverse voltage	V_R	max.	60	V
Repetitive peak reverse voltage	V_{RRM}	max.	60	V
Average rectified forward current	$I_{F(AV)}$	max.	300	mA [1]
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
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	K/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]) For pulse operation see Figs 6 and 7. For sinusoidal operation see Figs 8 to 11.

CHARACTERISTICS (continued) $T_j = 25\ ^{o}C$

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:

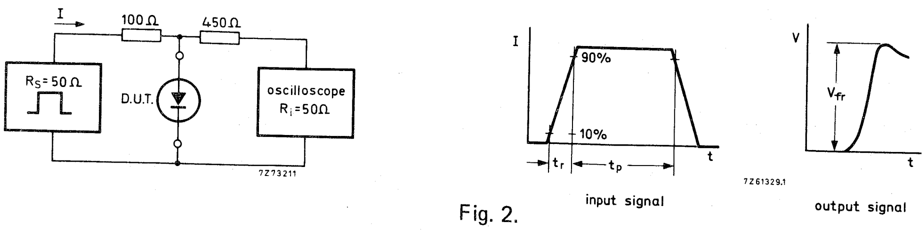


Fig. 2.

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 $C \le 20$ 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:

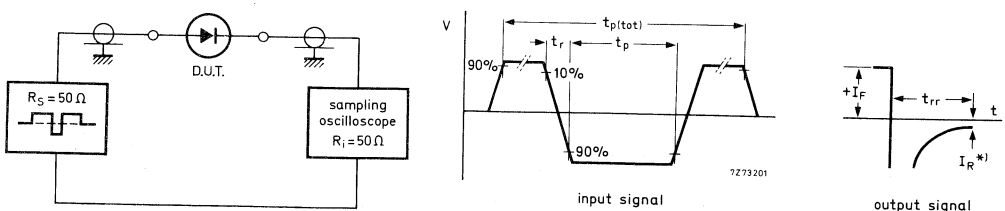


Fig. 3.

Input signal :	Total pulse duration	$t_{p(tot)}$	=	0,2 μs
	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

*) I_R = 40 mA

Circuit capacitance $C \le 1$ 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; $R_L = 500\ \Omega$ $\quad Q_s \quad < \quad 50 \quad$ pC

Test circuit and waveform:

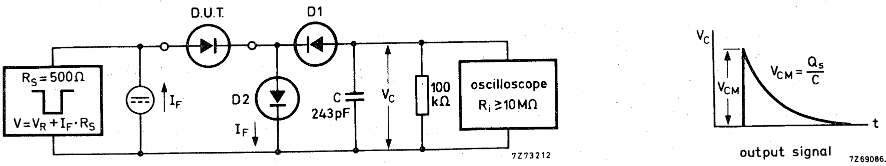


Fig. 4.

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

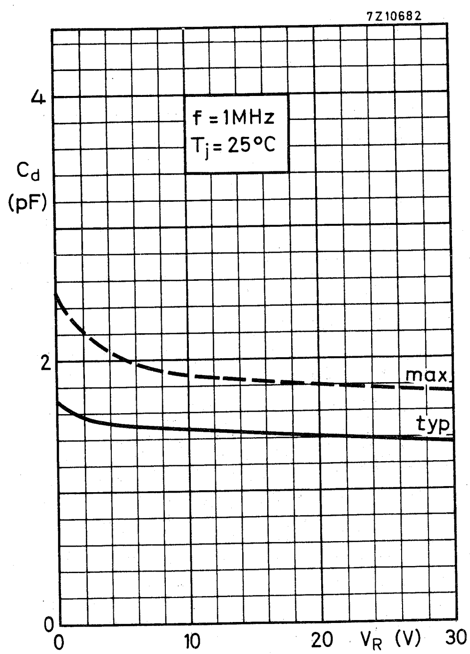


Fig. 5.

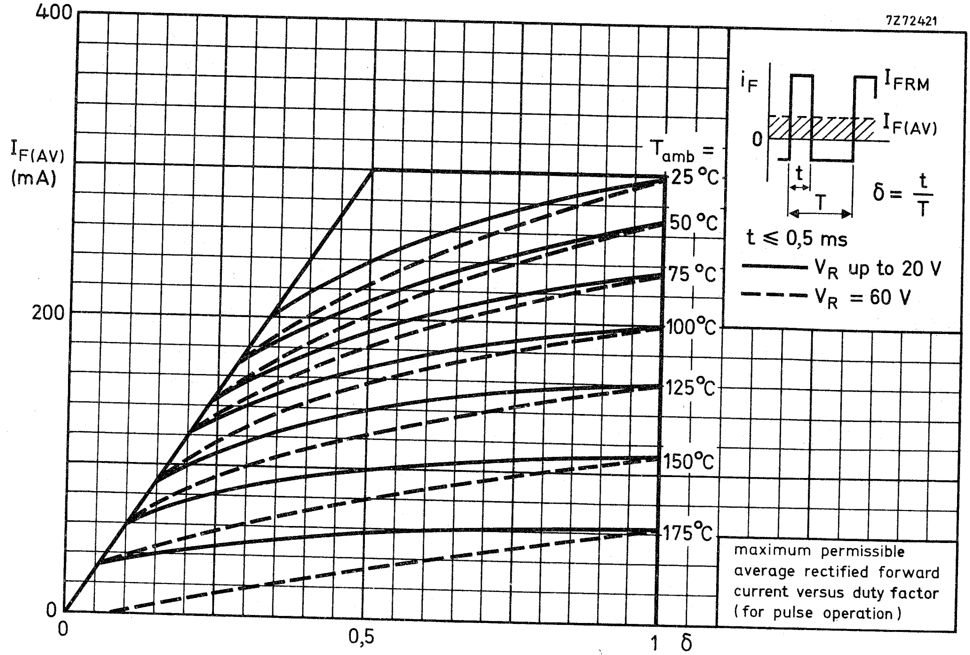

7Z72421
$I_{F(AV)}$ (mA)
400
200
0
0
0,5
1 δ
T_{amb} =
25 °C
50 °C
75 °C
100°C
125°C
150°C
175°C
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 6.

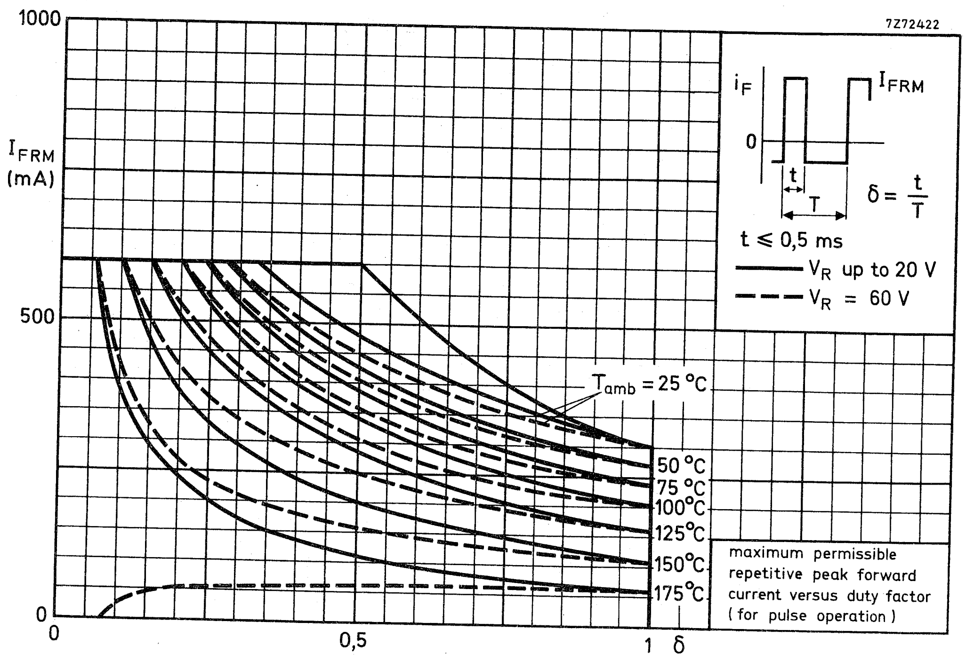

7Z72422
I_{FRM} (mA)
1000
500
0
0
0,5
1 δ
T_{amb} = 25 °C
50 °C
75 °C
100°C
125°C
150°C
175°C
i_F
I_{FRM}
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 7.

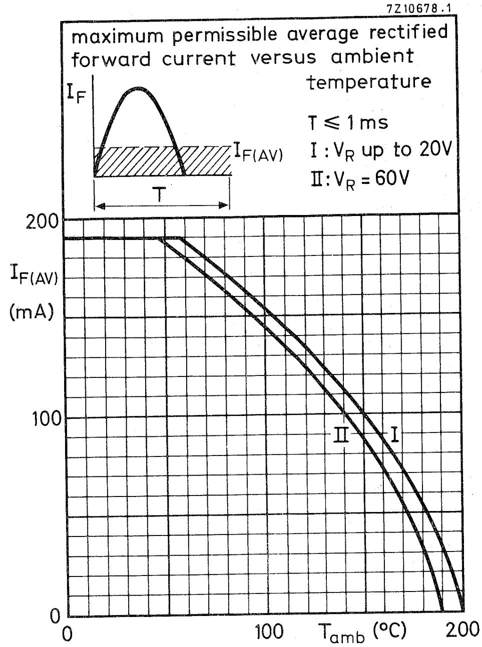


Fig. 8.

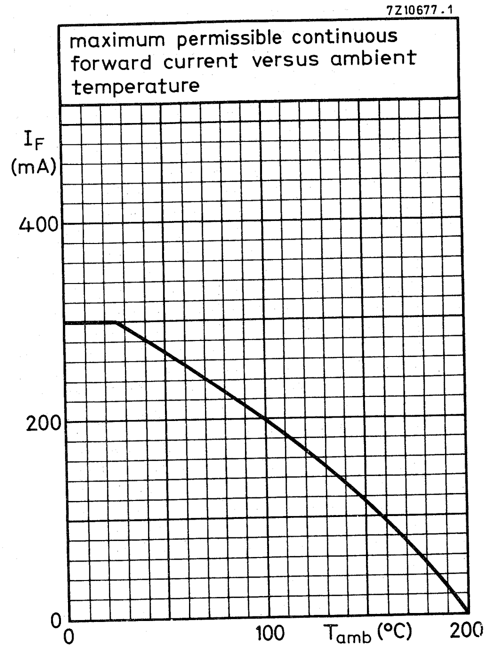


Fig. 9.

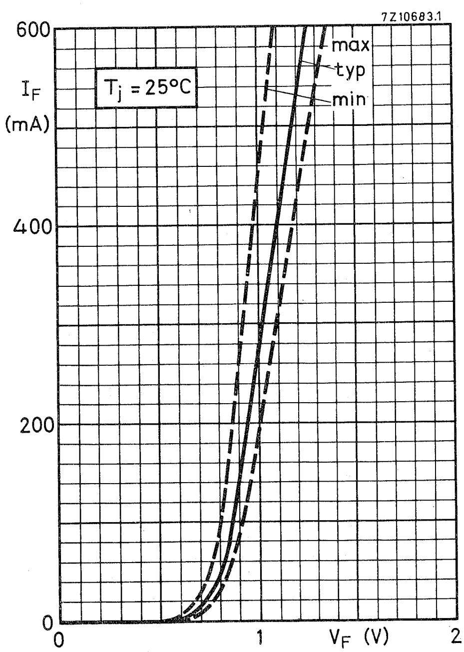


Fig. 10.

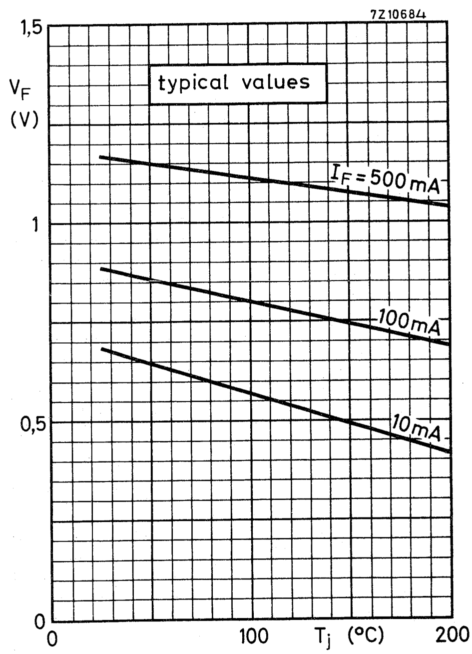


Fig. 11.

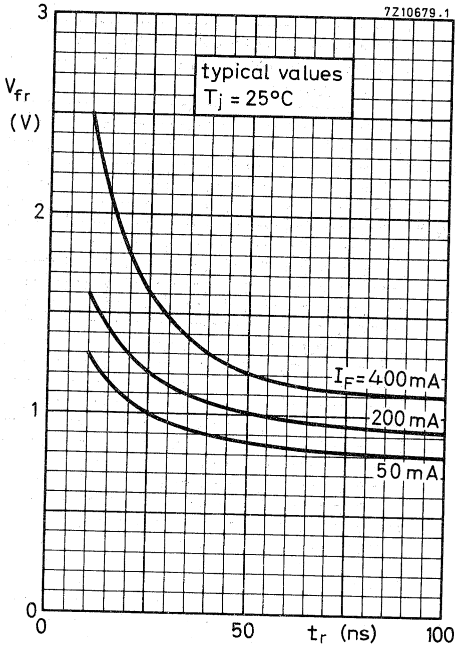


Fig. 12.

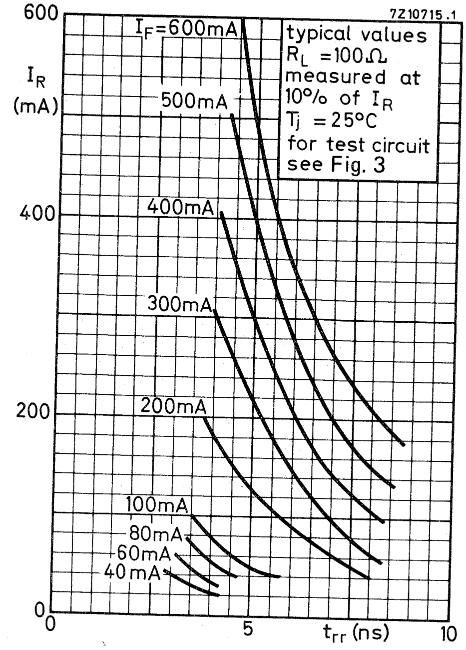


Fig. 13.

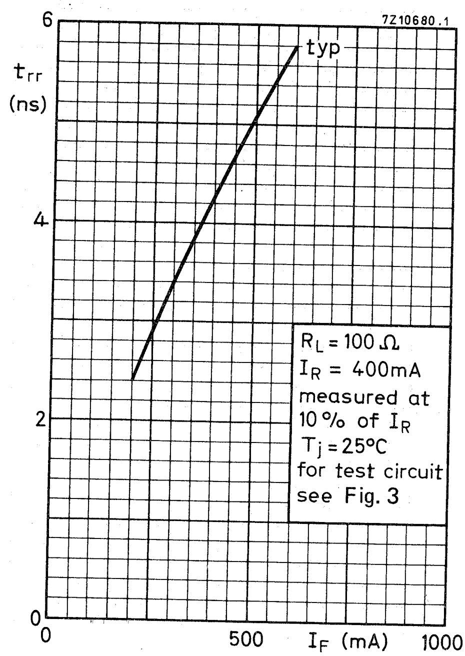


Fig. 14.

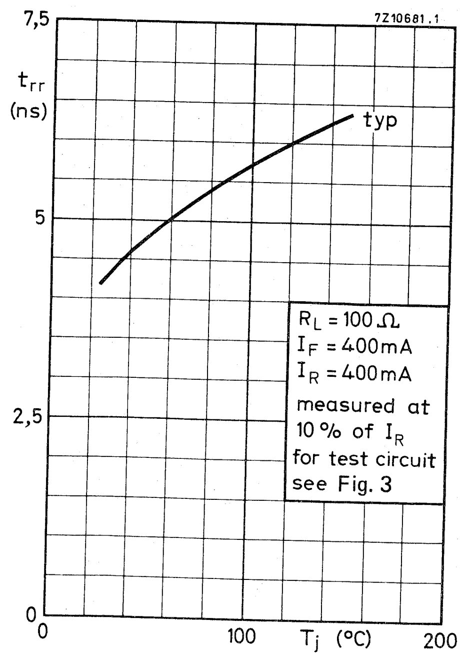


Fig. 15.

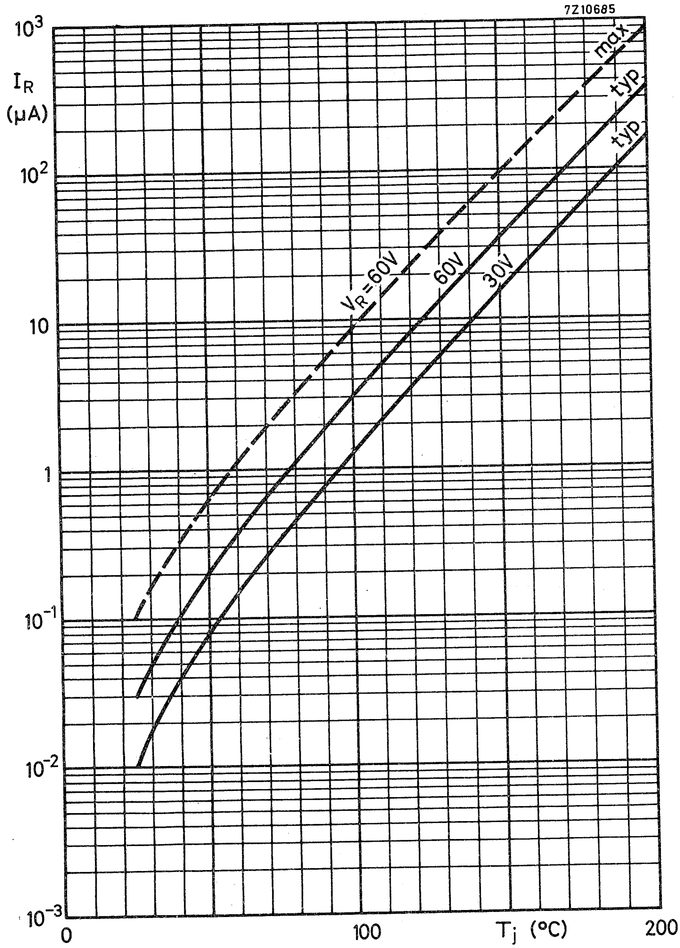

7Z10685
10^3
I_R
(μA)
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
T_j (°C)
200
max
typ
typ
V_R=60V
60V
30V

Fig.16.

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.

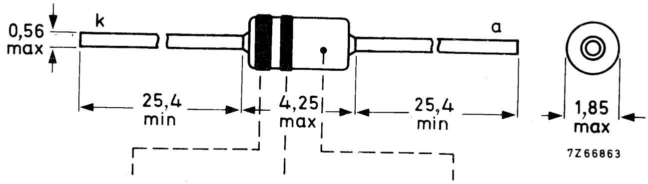
QUICK REFERENCE DATA

			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				^oC
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-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.

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

			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

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	$R_{th\ j-a}$	=	0,375	K/mW

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

CHARACTERISTICS

$T_j = 25\ ^oC$ unless otherwise specified

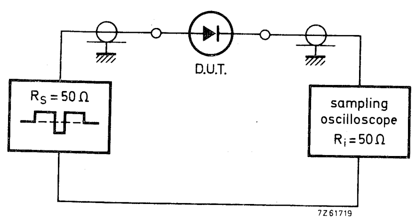
Forward voltage						
$I_F = 100$ mA		V_F	<	1,0		V
$I_F = 200$ mA		V_F	<	1,25		V

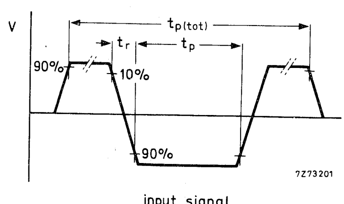
Reverse breakdown voltage

			BAV18	BAV19	BAV20	BAV21	
$I_R = 100\ \mu A$	$V_{(BR)R}$	>	60	120	200	250	V

Reverse current				
$V_R = V_{Rmax}$	I_R	<	100	nA
$V_R = V_{Rmax}$; $T_j = 150\ ^oC$	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; $R_L = 100\ \Omega$; measured at $I_R = 3$ mA	t_{rr}	<	50	ns

Test circuit and waveforms:





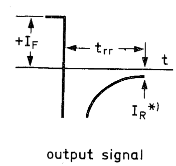


Fig. 2.

Input signal : Total pulse duration $t_{p(tot)} = 2\ \mu s$

Duty factor $\delta = 0,0025$

Rise time of the reverse pulse $t_r = 0,6$ ns

Reverse pulse duration $t_p = 100$ ns

*) $I_R = 3$ mA

Oscilloscope: Rise time $t_r = 0,35$ ns

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

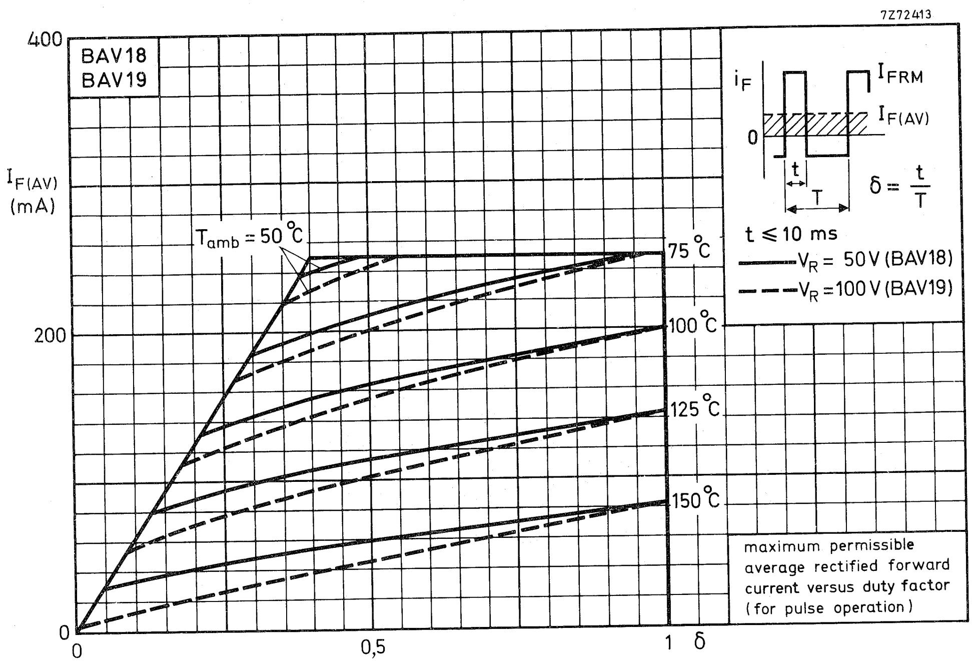

7Z72413
BAV18
BAV19
400
200
0
$I_{F(AV)}$ (mA)
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V (BAV18)
V_R = 100 V (BAV19)
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 3.

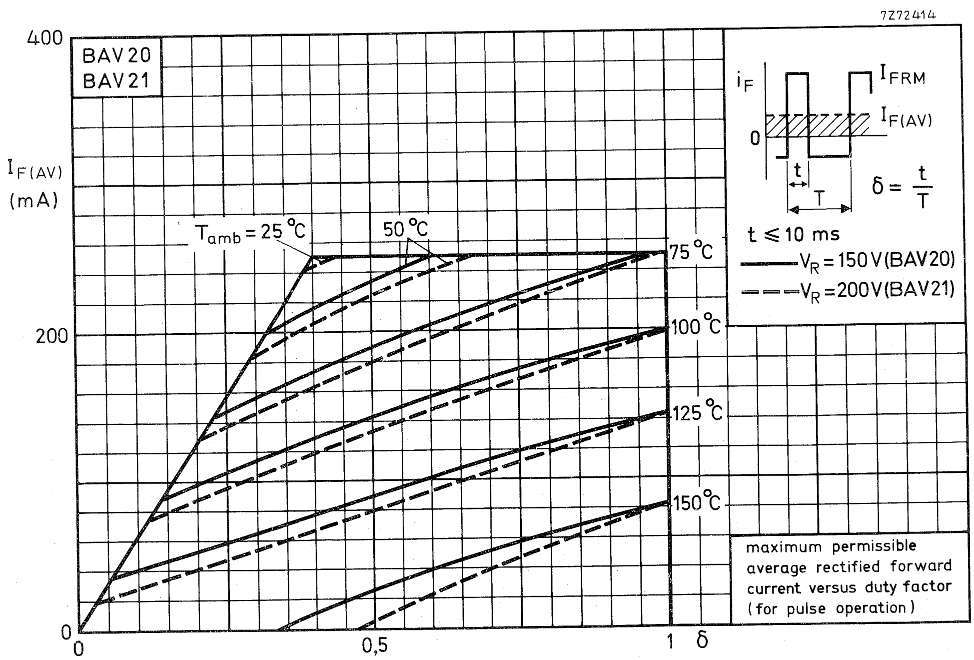

7Z72414
BAV20
BAV21
400
200
0
$I_{F(AV)}$ (mA)
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 150 V (BAV20)
V_R = 200 V (BAV21)
maximum permissible average rectified forward current versus duty factor (for pulse operation)

Fig. 4.

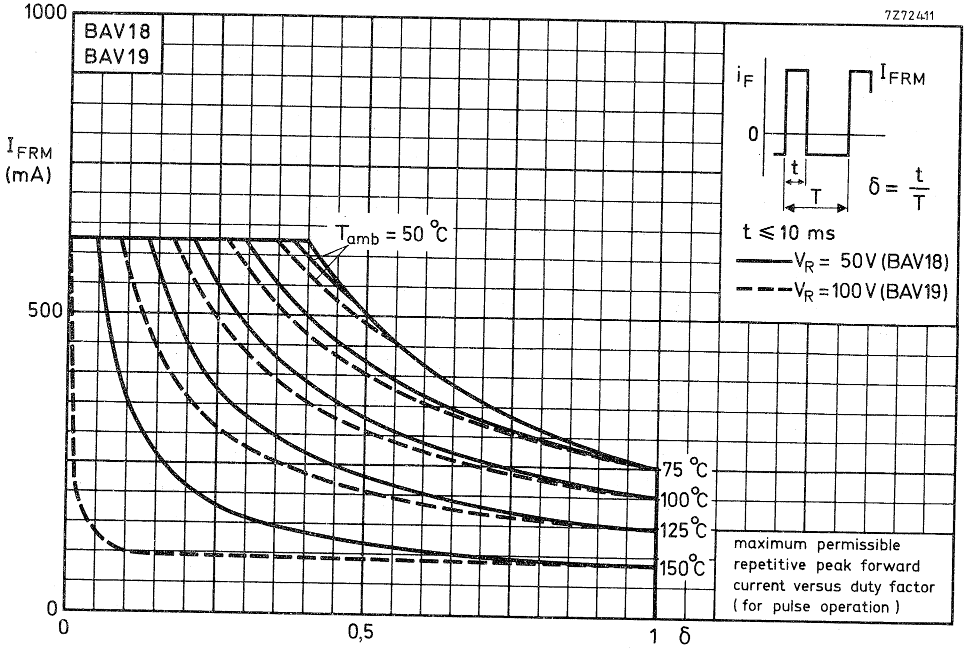

1000
BAV18
BAV19
7Z72411
I_{FRM}
(mA)
500
0
0
0,5
1 δ
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 50 V (BAV18)
V_R = 100 V (BAV19)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 5.

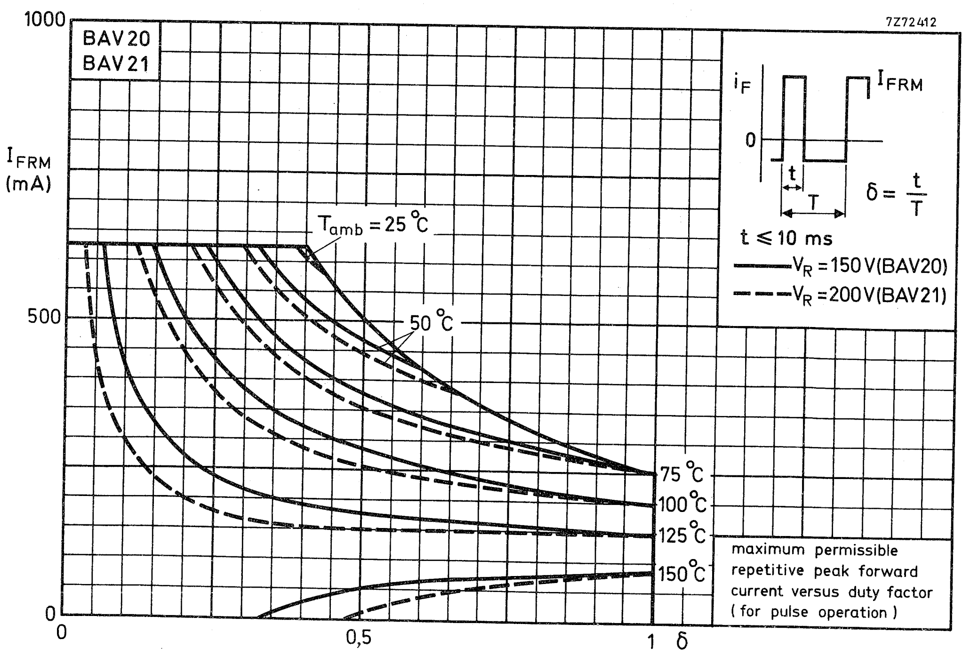

1000
BAV20
BAV21
7Z72412
I_{FRM}
(mA)
500
0
0
0,5
1 δ
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
i_F
I_{FRM}
0
t
T
δ = t/T
t ≤ 10 ms
V_R = 150 V (BAV20)
V_R = 200 V (BAV21)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 6.

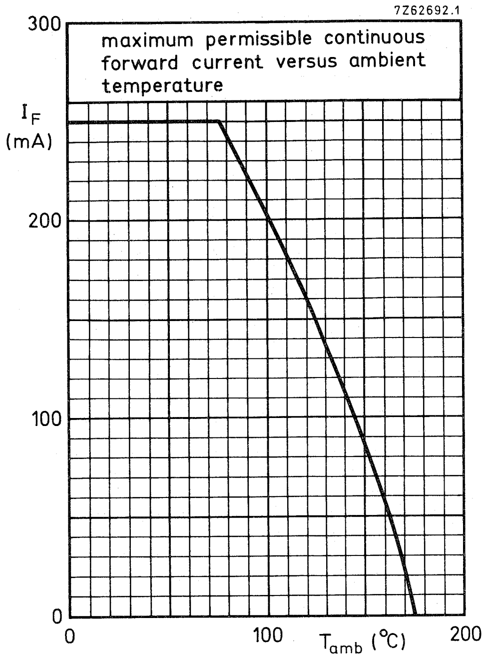


Fig. 7.

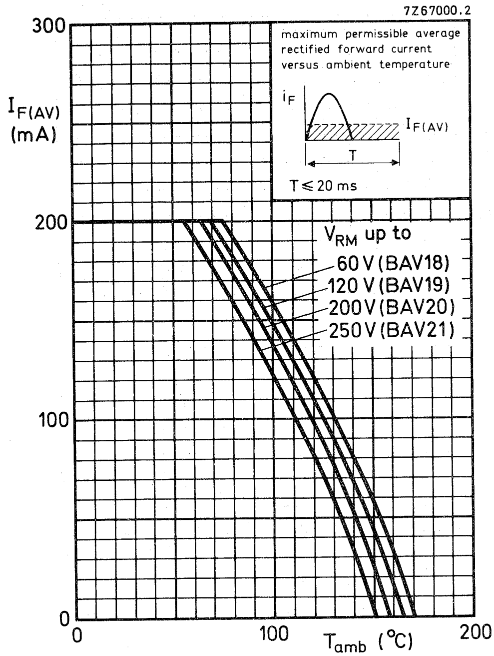


Fig. 8.

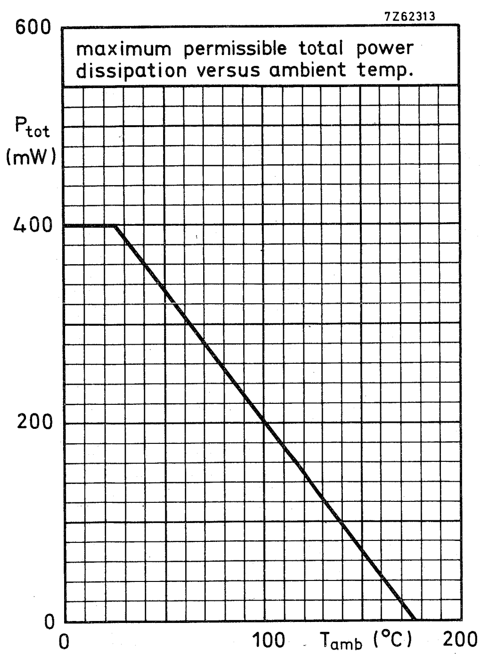


Fig. 9.

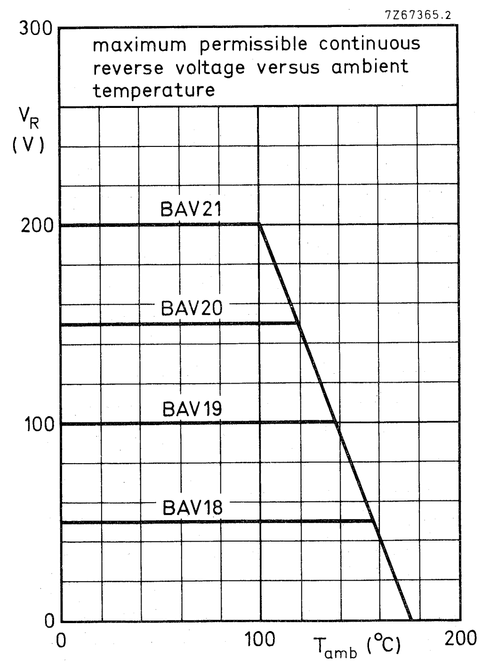


Fig. 10.

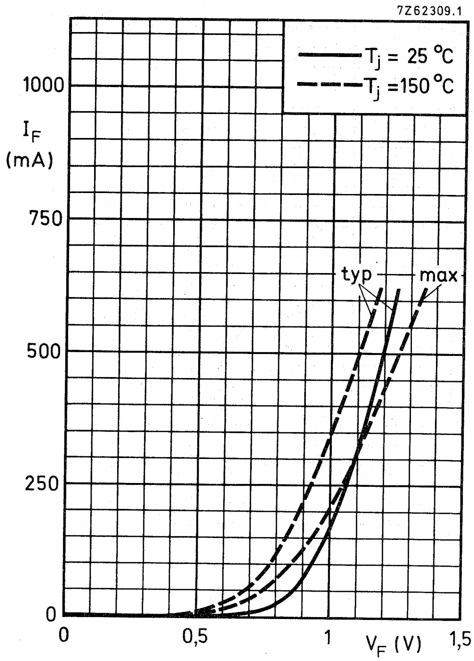


Fig. 11.

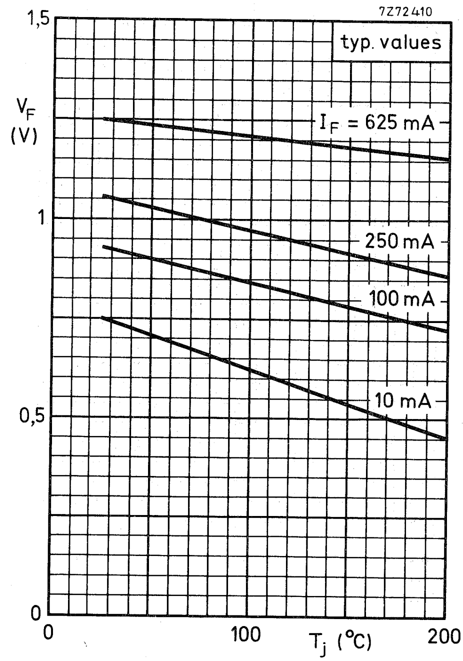


Fig. 12.

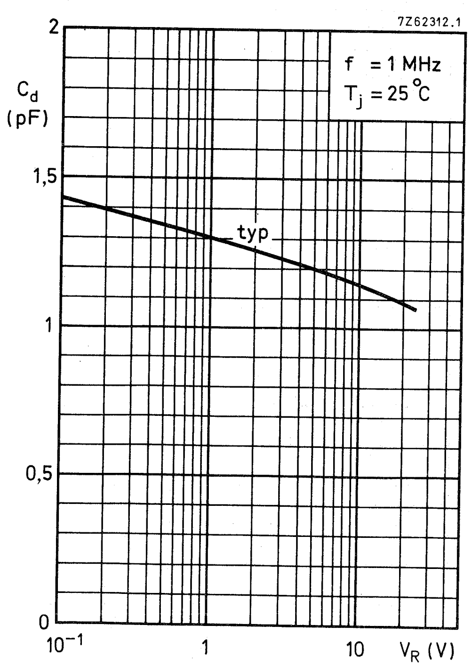


Fig. 13.

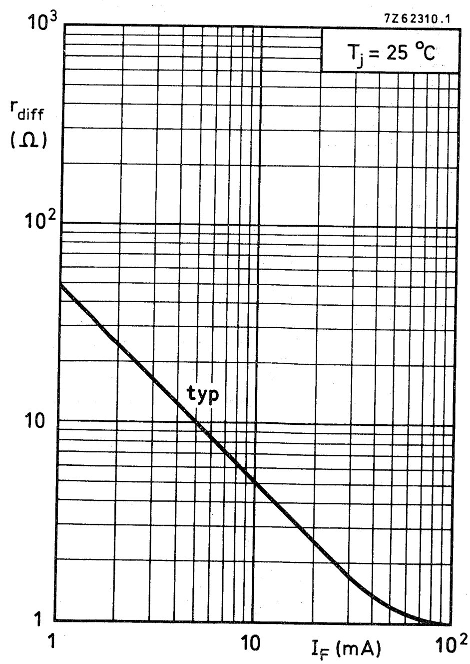


Fig. 14.

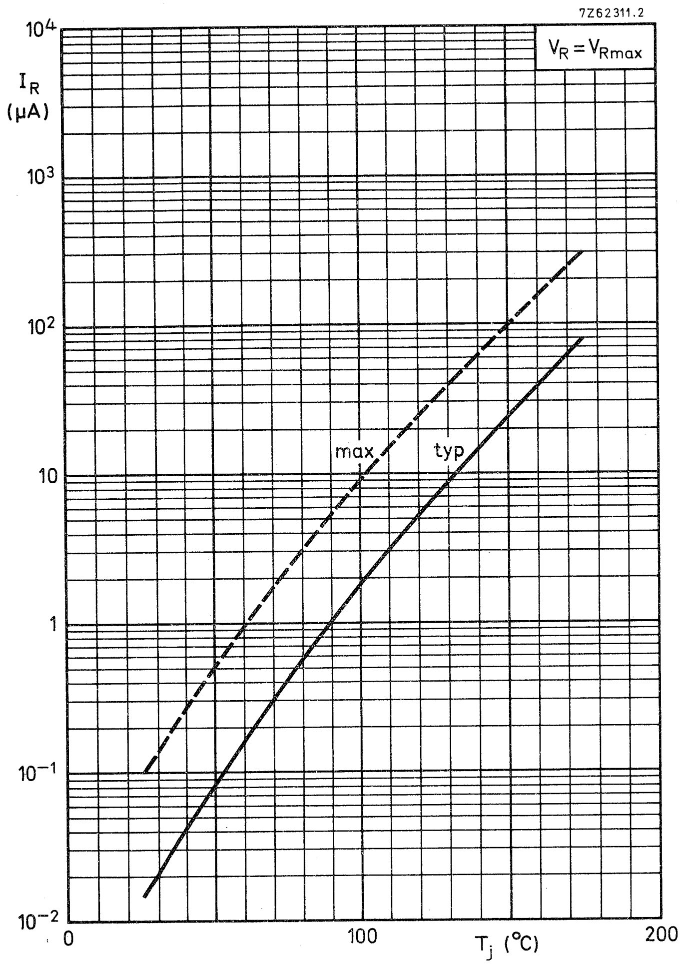

7Z62311.2
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

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

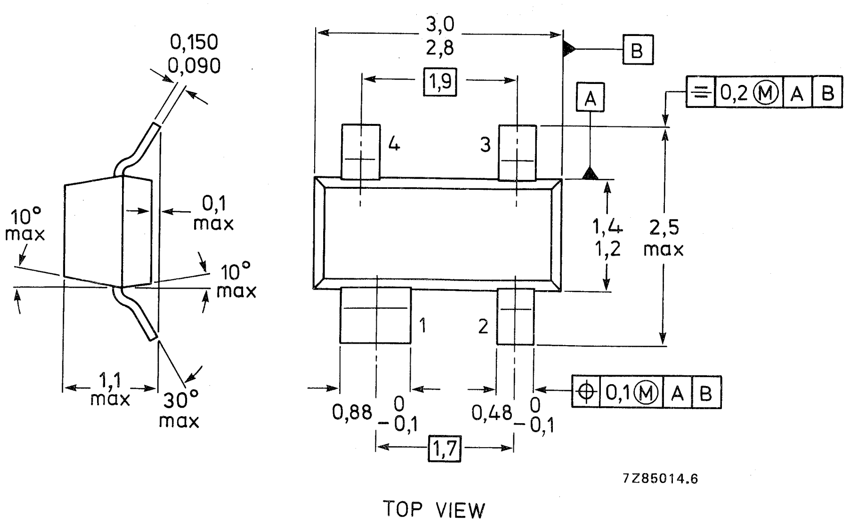
			single diode	series connection	
Continuous reverse voltage	V_R	max.	200	400	V
Repetitive peak rerverse voltage	V_{RRM}	max.	250	500	V
Average forward current	$I_{F(AV)}$	max.	200	120	mA
Repetitive peak forward current	I_{FRM}	max.	625	450	mA
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.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

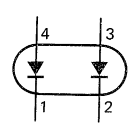
MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-143.

Marking code: L30





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
Non-repetitive peak forward current t = 1 μs;	I_{FSM}	max.	2,5	1,5	A
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 8 mm x 10 mm x 0,6 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 I_F = 200 mA	V_F	< <	1000 1250	2000 2500	mV mV
Reverse current $V_R = V_{Rmax}$	I_R	<	100	100	nA
Reverse breakdown voltage 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

Silicon planar epitaxial high-speed diode

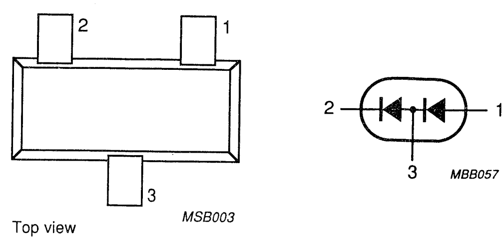
BAV23S

DESCRIPTION

The BAV23S consists of two 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

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_R	continuous reverse voltage			
	single diode		200	V
	series connection		400	V
V_{RRM}	repetitive peak reverse voltage			
	single diode		250	V
	series connection		500	V
I_{FRM}	repetitive peak forward current			
	single diode		625	mA
	series connection		450	mA
$I_{F(AV)}$	average forward current			
	single diode		200	mA
	series connection		120	mA
P_{tot}	total power dissipation	T_{amb} = 25 °C	300	mW
t_{rr}	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	50	ns



Marking code: L31.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage				
	single diode		–	200	V
	series connection		–	400	V
V_{RRM}	repetitive peak reverse voltage				
	single diode		–	250	V
	series connection		–	500	V
$I_{F(AV)}$	average forward current				
	single diode		–	200	mA
	series connection		–	120	mA
I_{FRM}	repetitive peak forward current				
	single diode		–	625	mA
	series connection		–	450	mA
I_{FSM}	non-repetitive peak forward current	t = 1 s			
	single diode		–	0.5	A
	series connection		–	0.4	A
		t = 1 µs			
	single diode		–	2.5	A
	series connection		–	1.5	A
P_{tot}	total power dissipation		–	300	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

THERMAL RESISTANCE

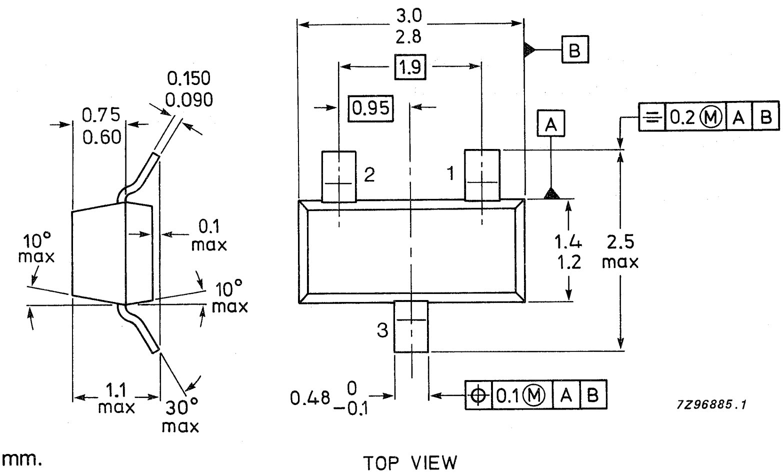
SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	mounted on FR4 printboard	500 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA			
	single diode		250	–	V
	series connection		500	–	V
V_F	forward voltage	I_F = 100 mA			
	single diode		–	1	V
	series connection		–	2	V
		I_F = 200 mA			
	single diode		–	1.25	V
	series connection		–	2.5	V
I_R	reverse current	$V_R = V_{R\ max}$	–	100	nA
C_d	diode capacitance	V_R = 0; f = 1 MHz			
	single diode		–	5	pF
	series connection		–	2.5	pF
t_{rr}	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	–	50	ns

PACKAGE OUTLINE



Dimensions in mm.

Fig.2 SOT23.

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.

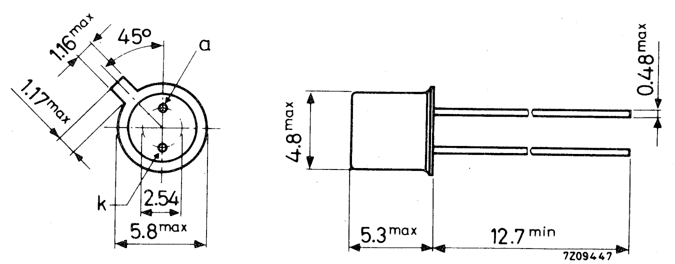
QUICK REFERENCE DATA

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 MHz	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

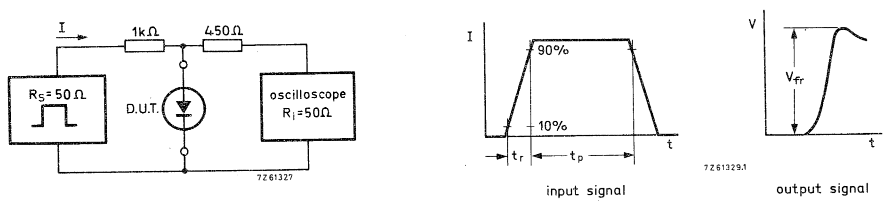


Fig. 2 Test circuit and waveforms.

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

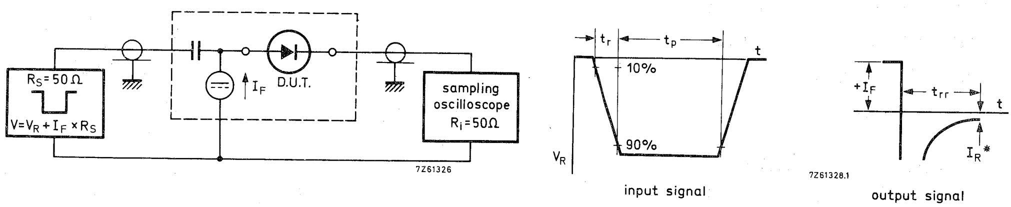


Fig. 3 Test circuit and waveforms.

* 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)

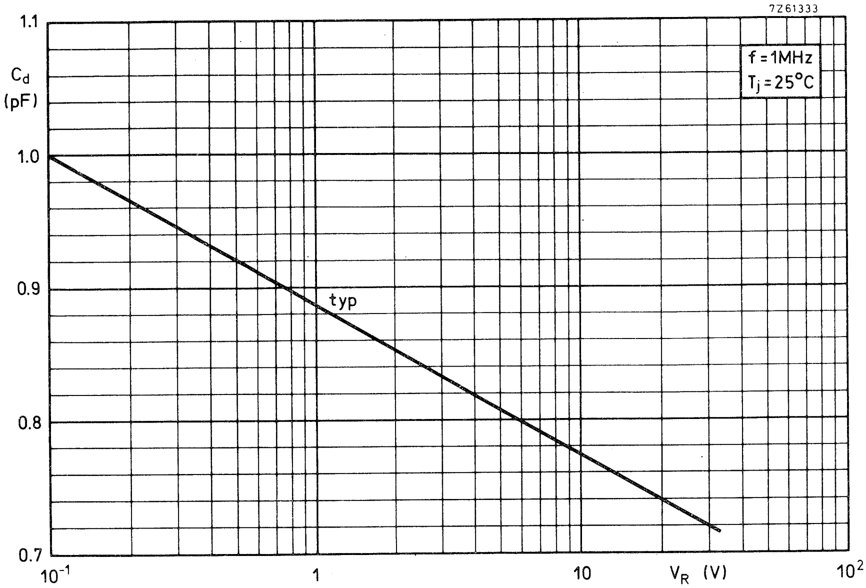

7Z61333
1.1
C_d
(pF)
1.0
0.9
0.8
0.7
f = 1MHz
T_j = 25°C
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 4.

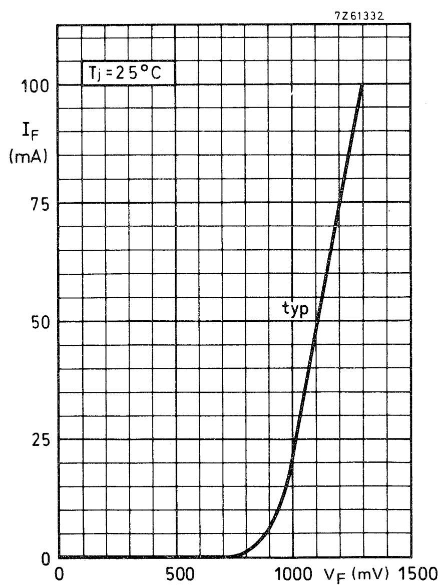

7Z61332
T_j = 25 °C
100
I_F
(mA)
75
50
25
0
typ
0
500
1000
V_F (mV)
1500

Fig. 5.

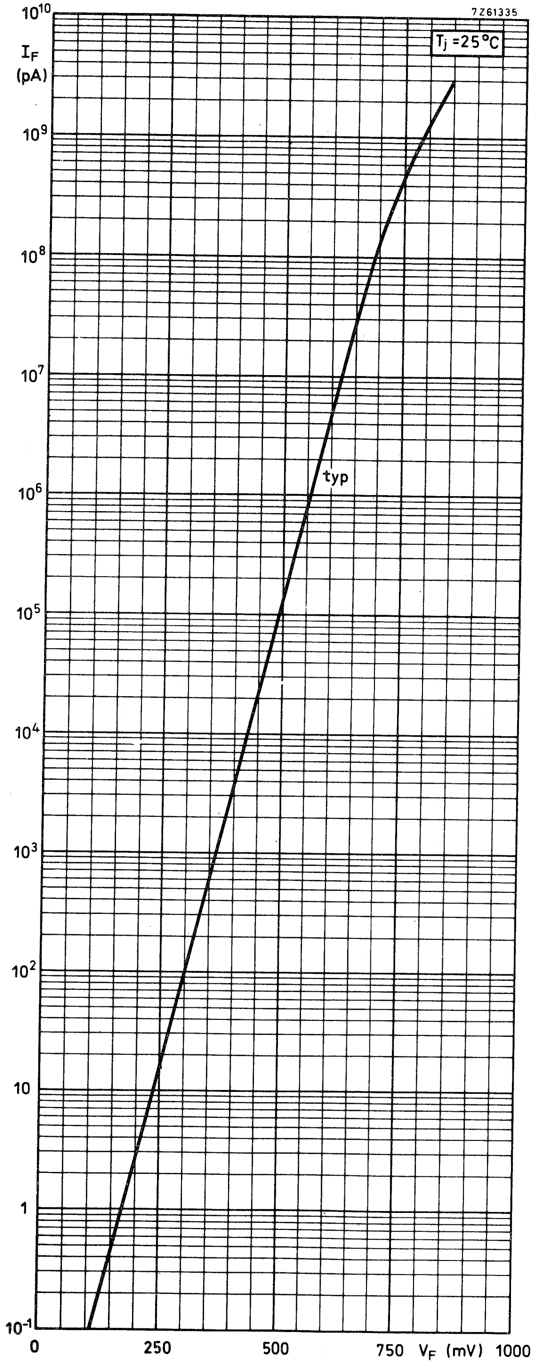

7Z61335
$T_j = 25\,^\circ C$
I_F
(pA)
10^{10}
10^9
10^8
10^7
10^6
10^5
10^4
10^3
10^2
10
1
10^{-1}
typ
0
250
500
750
V_F (mV)
1000

Fig. 6.

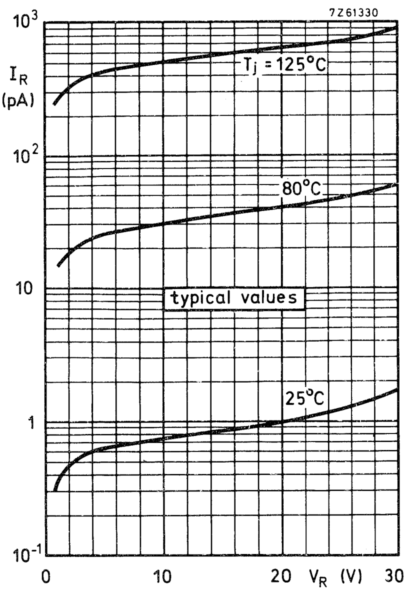

7Z61330
I_R (pA)
10^3
10^2
10
1
10^{-1}
T_j = 125°C
80°C
typical values
25°C
0
10
20
30
V_R (V)

Fig. 7.

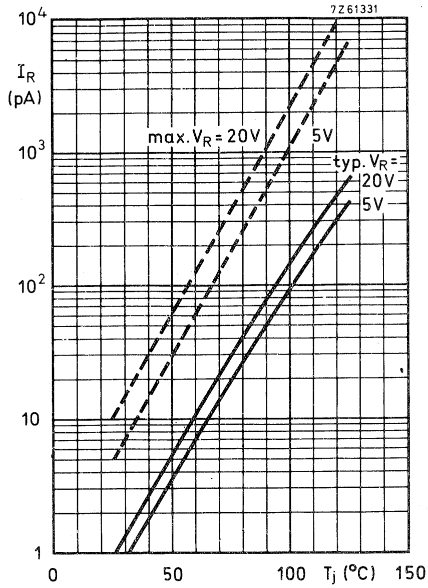

7Z61331
I_R (pA)
10^4
10^3
10^2
10
1
max. V_R = 20V
5V
typ. V_R =
20V
5V
0
50
100
150
T_j (°C)

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.	450	mA
Junction temperature	T_j	max.	150	°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

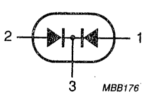
MECHANICAL DATA

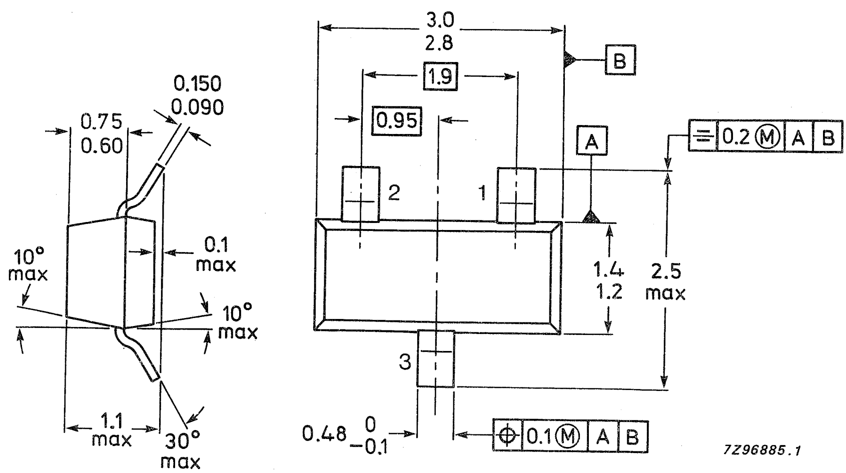
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAV70 = A4p





TOP VIEW

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.	215 mA
Forward current (DC)	I_F	max.	215 mA
Repetitive peak forward current	I_{FRM}	max.	450 mA
Non-repetitive peak forward current (per crystal)			
t = 1 μs	I_{FSM}	max.	2 A
t = 1 ms	I_{FSM}	max.	1 A
t = 1 s	I_{FSM}	max.	0,5 A
Storage temperature range	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 = 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	<	2.5 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 see Fig. 2	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.

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

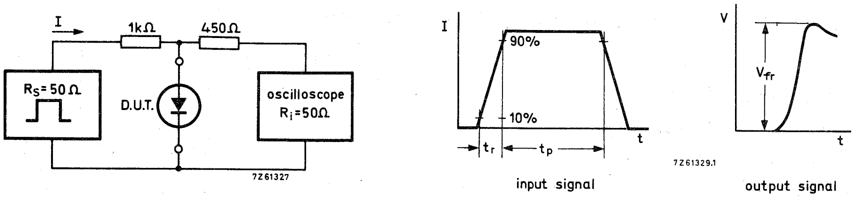


Fig. 2 Test circuit and waveforms; forward recovery voltage.

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 see Fig. 3 — t_{rr} < 6 ns

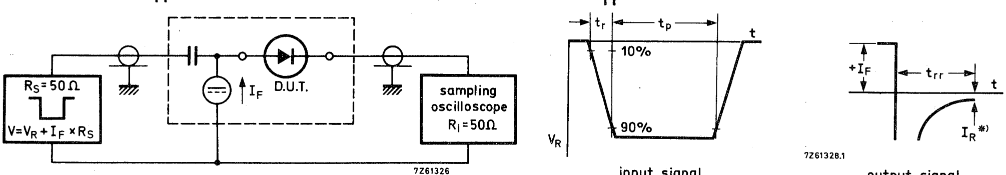


Fig. 3 Test circuit and waveforms; reverse recovery time.

*) 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 see Fig. 4 — Q_s < 45 pC

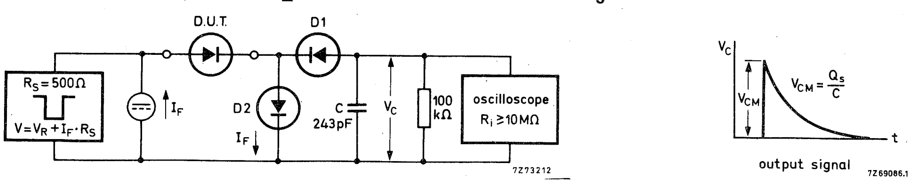


Fig. 4 Test circuit and waveform; recovery charge.

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

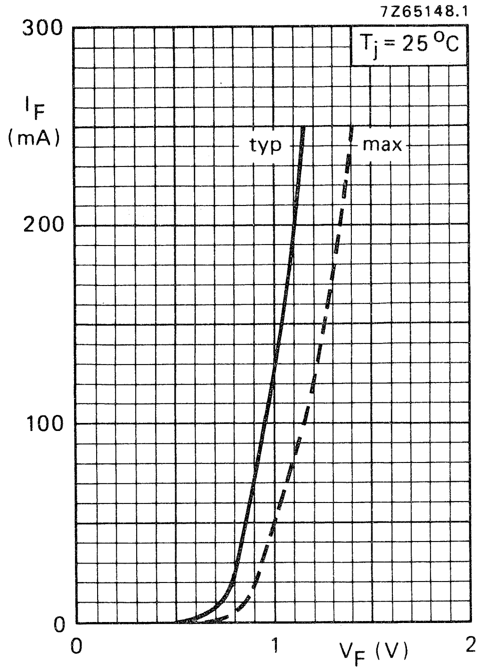


Fig. 5

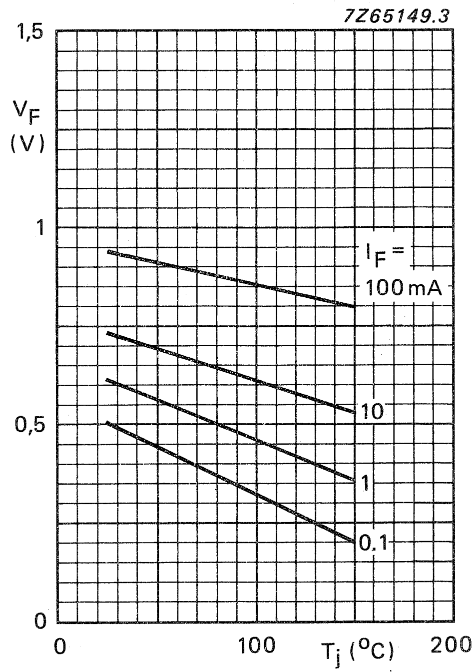


Fig. 6

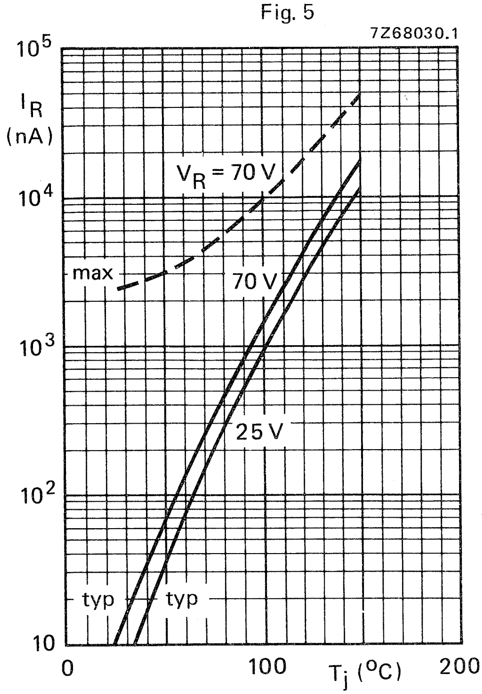


Fig. 7

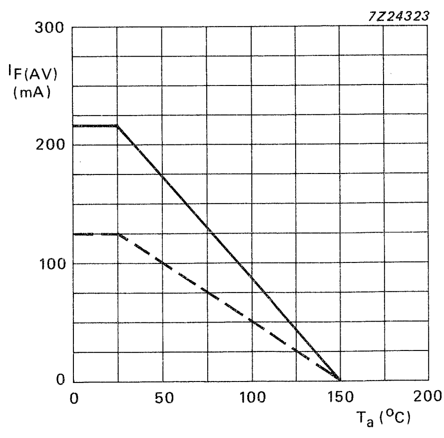


Fig. 8 ——— single diode
– – – – – – double diode, equally loaded.

SILICON PLANAR EPITAXIAL HIGH-SPEED DIODE

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

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	50 V
Repetitive peak reverse voltage	V_{RRM}	max.	50 V
Repetitive peak forward current	I_{FRM}	max.	250 mA
Junction temperature	T_j	max.	150 °C
Forward voltage I_F = 100 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}	≤	4 ns

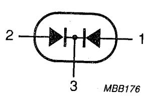
MECHANICAL DATA

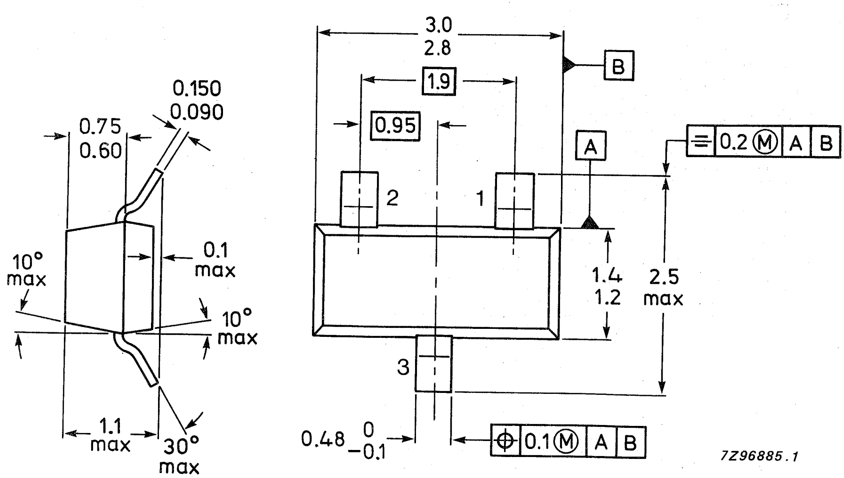
Fig. 1 SOT-23.

Dimensions in mm

Marking code

BAV74 = JAp





TOP VIEW

RATINGS (per diode)

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; t_p = 10 ms)	$I_{F(AV)}$	max.	250 mA
Forward current (d.c. or average)	I_F	max.	250 mA
Repetitive peak forward current	I_{FRM}	max.	250 mA
Non-repetitive peak forward current t = 1 μs	I_{FSM}	max.	4,5 A
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 **	$R_{th\ j\text{-}a}$	max.	430 K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Breakdown voltage at I_R = 100 μA	$V_{(BR)R}$	⩾	50 V
Forward voltage I_F = 100 mA	V_F	⩽	1,0 V
Reverse currents V_R = 50 V	I_R	⩽	0,1 μA
V_R = 50 V; T_{amb} = 150 °C	I_R	⩽	100 μA
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 See Fig. 2	t_{rr}	⩽	4 ns
Diode capacitance at V_R = 0; f = 1 MHz	C_d	⩽	2 pF

* See Thermal Characteristics.
** When mounted on ceramic substrate of 8 mm x 10 mm x 0,7 mm.

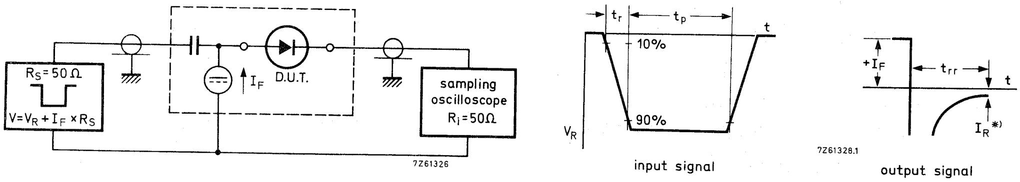


Fig. 2 Reverse recovery time test circuit and waveforms.

* 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)

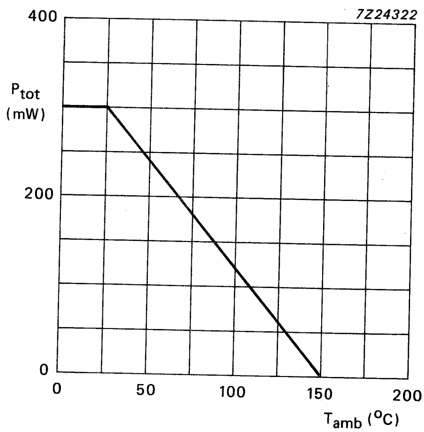


Fig. 3 Power derating curve.

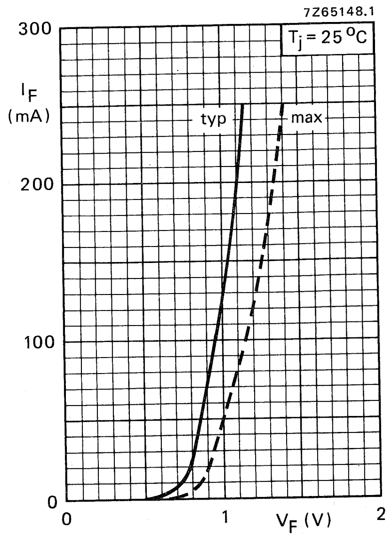


Fig. 4 Forward current as a function of forward voltage.

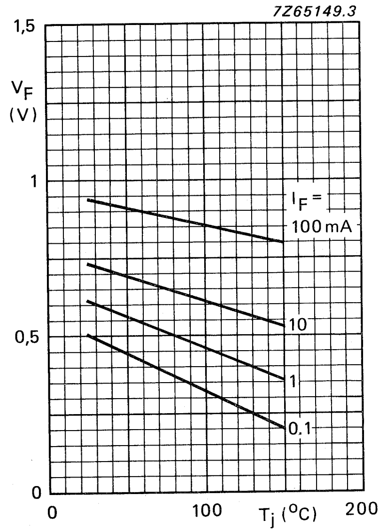


Fig. 5 Forward voltage as a function of junction temperature.

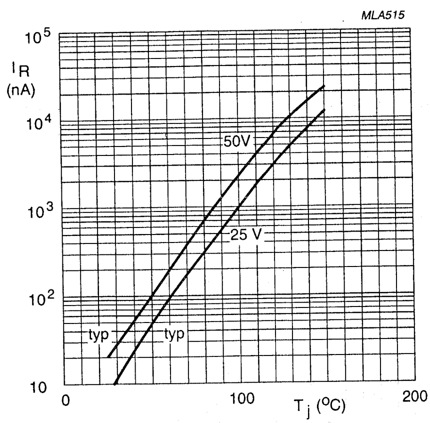


Fig. 6 Reverse current as a function of junction temperature.

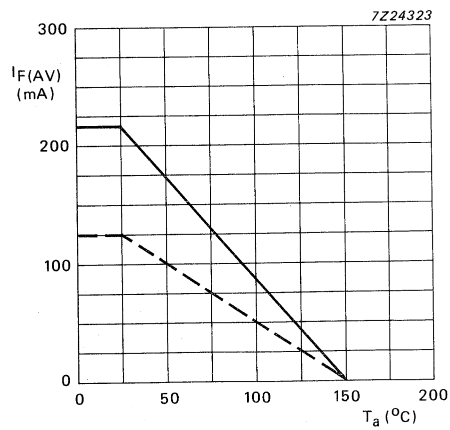


Fig. 7 Average current as a function of ambient temperature: ——— single diode; ------------ double diode, equally loaded.

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.	450	mA
Junction temperature	T_j	max.	150	^oC
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

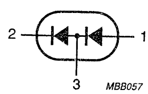
MECHANICAL DATA

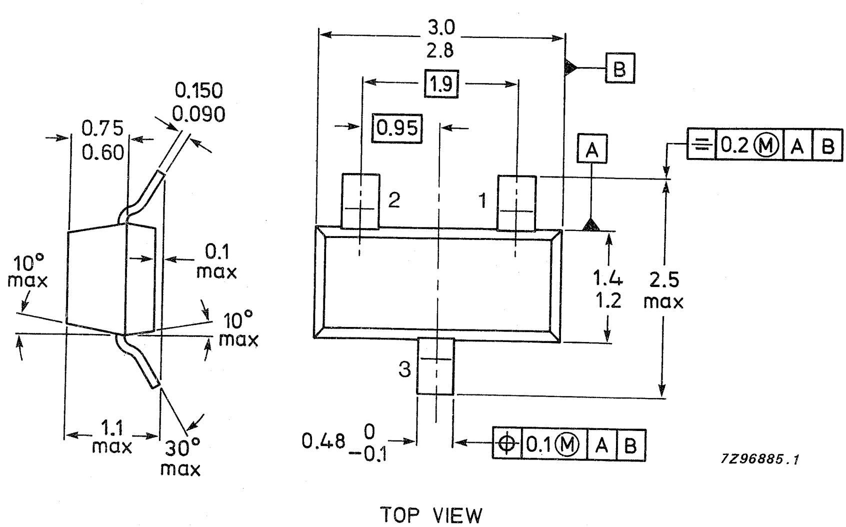
Fig. 1 SOT-23.

Dimensions in mm

Marking code

BAV99 = A7p





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.	215 mA
Forward current (d.c.)	I_F	max.	215 mA
Repetitive peak forward current	I_{FRM}	max.	450 mA
Non-repetitive peak forward current (per crystal)			
t = 1 μs	I_{FSM}	max.	2 A
t = 1 ms	I_{FSM}	max.	1 A
t = 1 s	I_{FSM}	max.	0,5 A
Storage temperature range	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 = 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	<	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 8 mm x 10 mm x 0,7 mm.

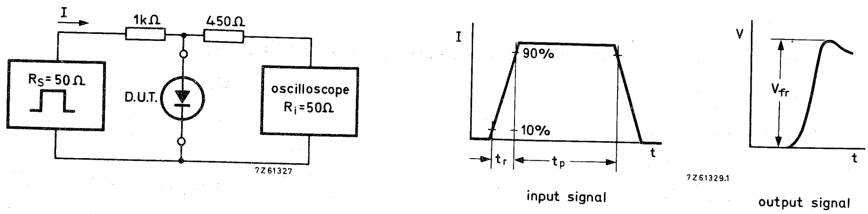


Fig. 2 Test circuit and waveforms; forward recovery voltage.

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

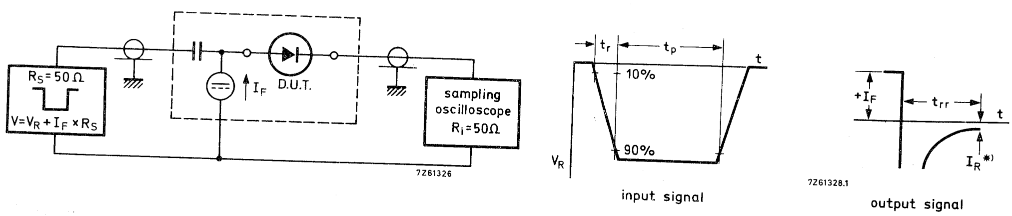


Fig. 3 Test circuit and waveforms; reverse recovery time.

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.

*) I_R = 1 mA

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

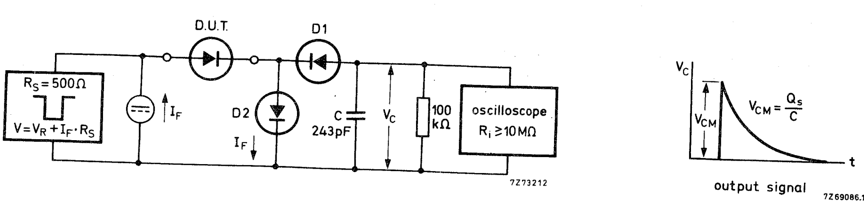


Fig. 4 Test and waveform; recovery charge.

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

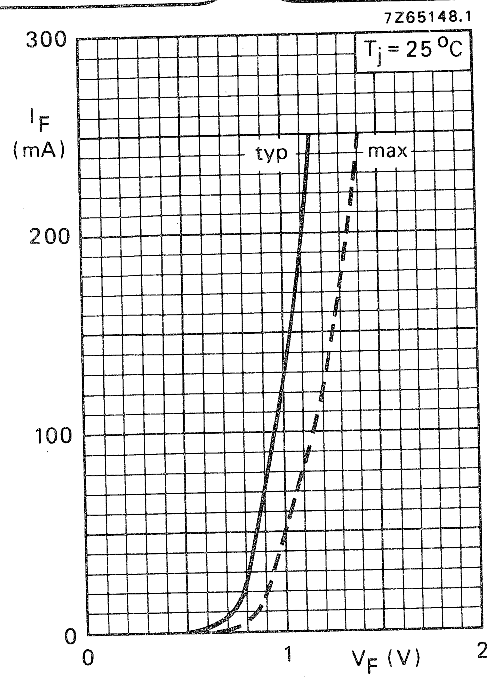


Fig. 5.

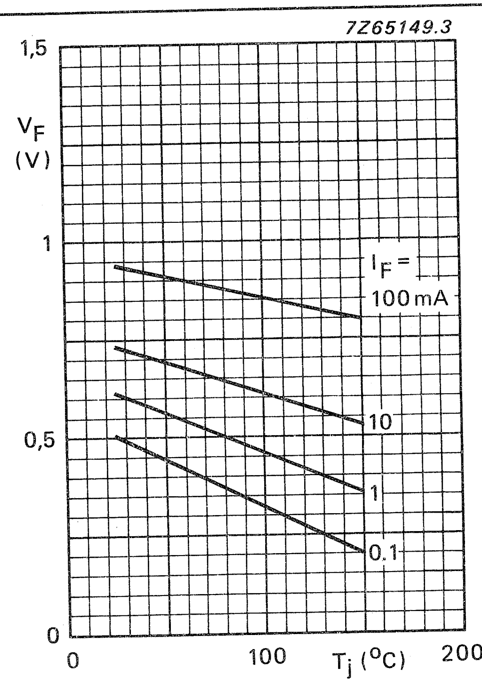


Fig. 6 Typical values.

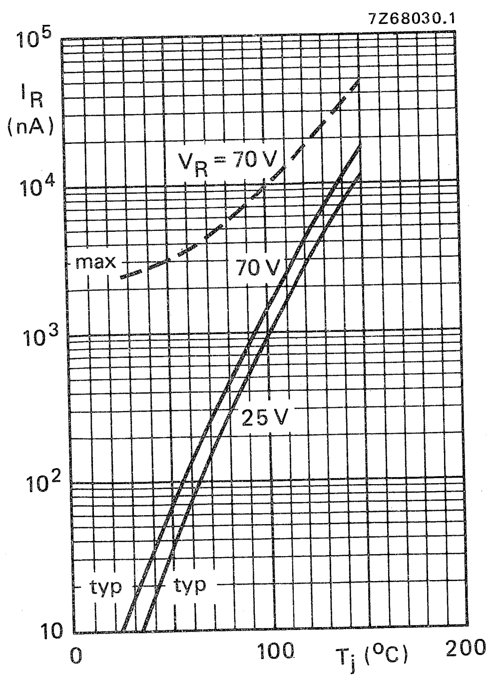


Fig. 7.

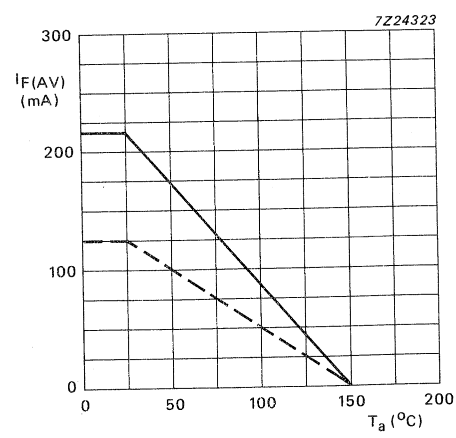


Fig. 8 ——— single diode
------ double diode; equally loaded.

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.

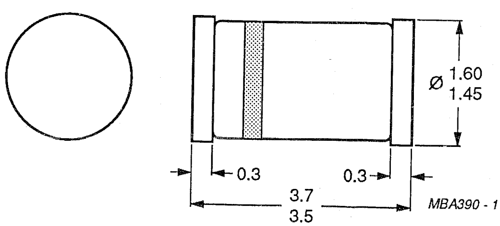
QUICK REFERENCE DATA

			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

Fig. 1 SOD-80C.

Dimensions in mm



The cathode is indicated by a green 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

			BAV100	BAV101	BAV102	BAV103	
Forward voltage							
$I_F = 100$ mA	V_F	<	1,0				V
$I_F = 200$ mA	V_F	<	1,25				V
Reverse breakdown voltage $I_R = 100$ μA	$V_{(BR)R}$	>	60	120	200	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
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.

Test circuit and waveforms:

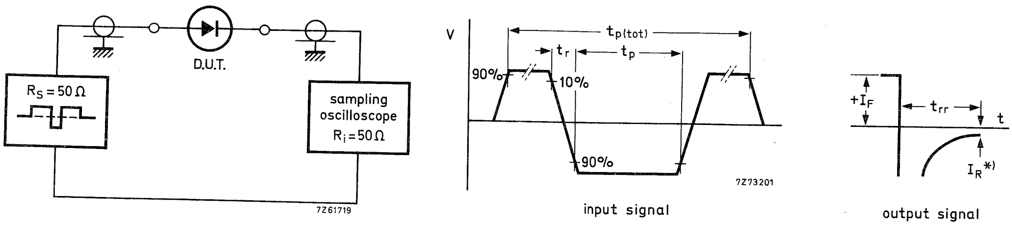


Fig. 2.

*) $I_R = 3$ 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)

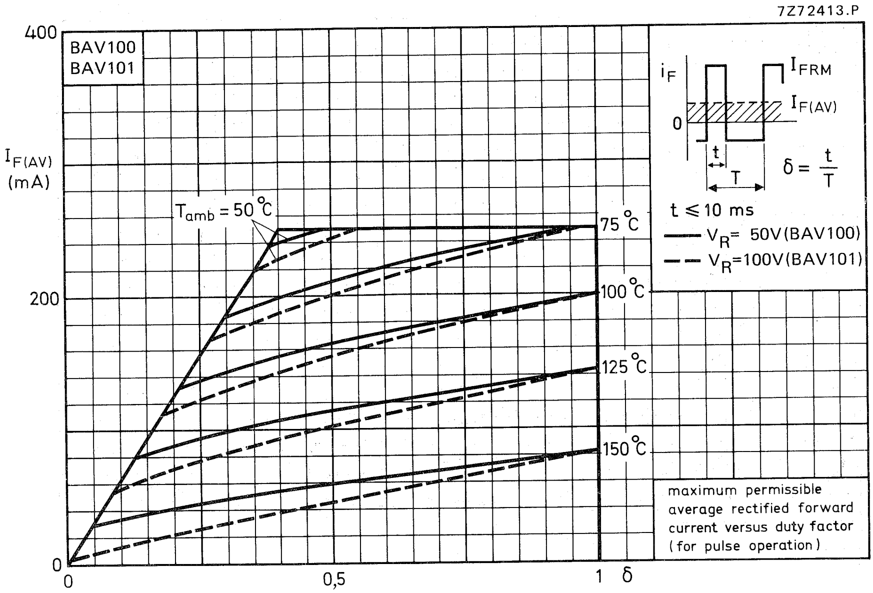

7Z72413.P
400
200
0
0
0,5
1 δ
BAV100
BAV101
I F(AV)
(mA)
Tamb = 50 °C
75 °C
100 °C
125 °C
150 °C
iF
IFRM
IF(AV)
0
t
T
δ = t/T
t ≤ 10 ms
VR= 50V(BAV100)
VR=100V(BAV101)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 3.

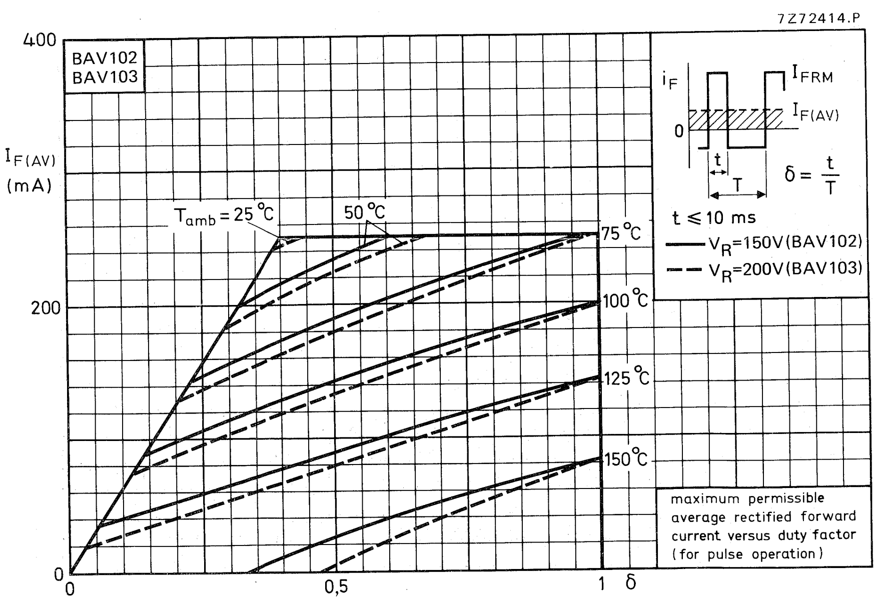

7Z72414.P
400
200
0
0
0,5
1 δ
BAV102
BAV103
I F(AV)
(mA)
Tamb = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
iF
IFRM
IF(AV)
0
t
T
δ = t/T
t ≤ 10 ms
VR=150V(BAV102)
VR=200V(BAV103)
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 4.

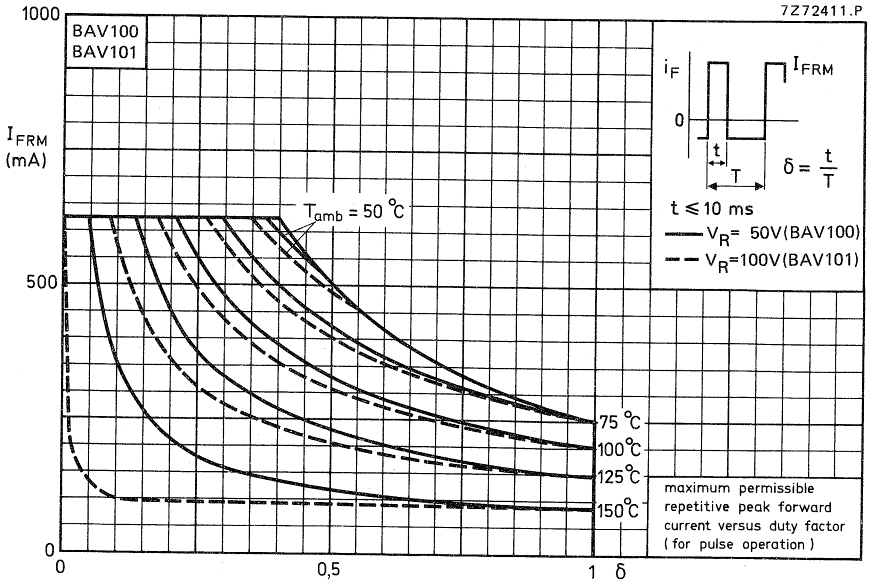

7Z72411.P
BAV100
BAV101
1000
500
0
I_{FRM} (mA)
T_{amb} = 50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
t
T
δ = t/T
t ≤ 10 ms
V_R = 50V (BAV100)
V_R = 100V (BAV101)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 5.

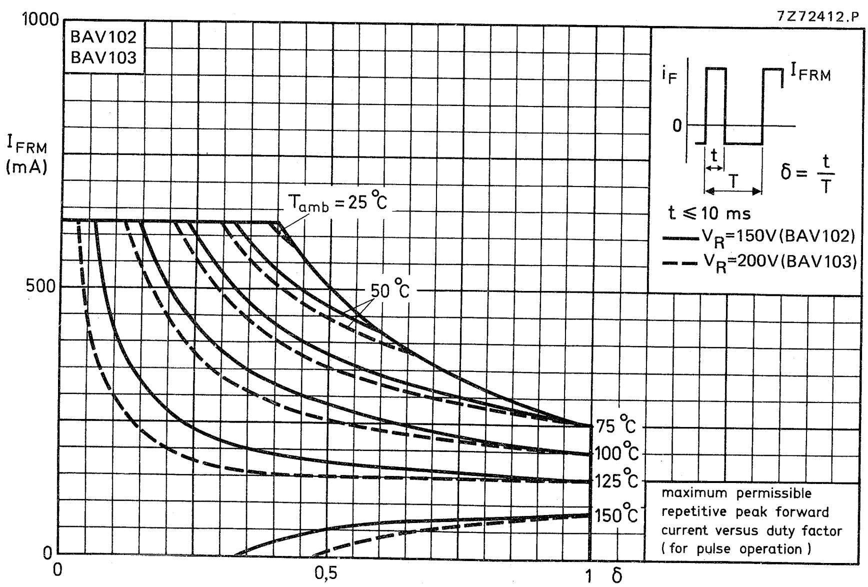

7Z72412.P
BAV102
BAV103
1000
500
0
I_{FRM} (mA)
T_{amb} = 25 °C
50 °C
75 °C
100 °C
125 °C
150 °C
0
0,5
1 δ
i_F
I_{FRM}
t
T
δ = t/T
t ≤ 10 ms
V_R = 150V (BAV102)
V_R = 200V (BAV103)
maximum permissible repetitive peak forward current versus duty factor (for pulse operation)

Fig. 6.

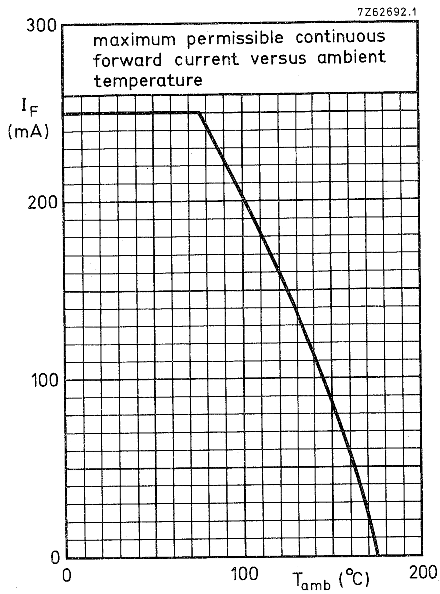


Fig. 7.

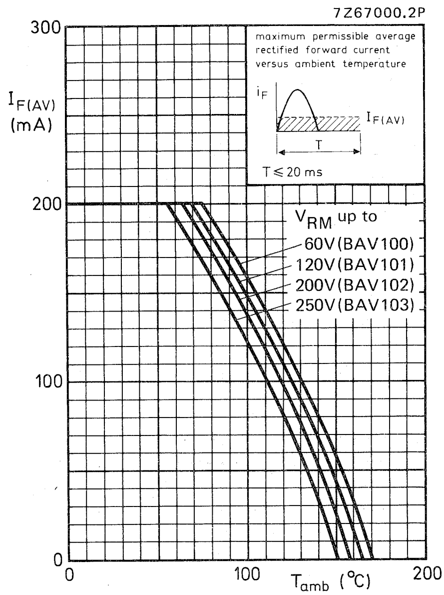


Fig. 8.

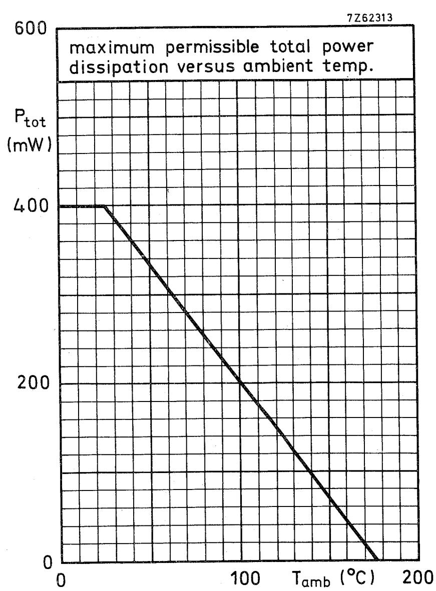


Fig. 9.

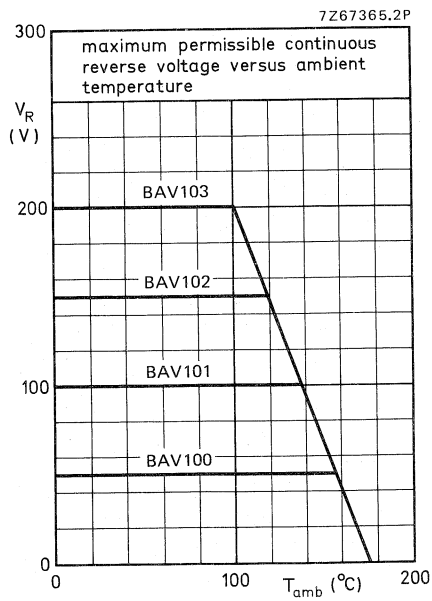


Fig. 10.

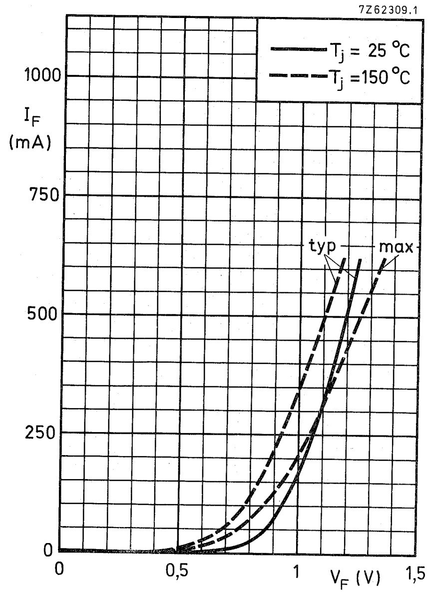


Fig. 11.

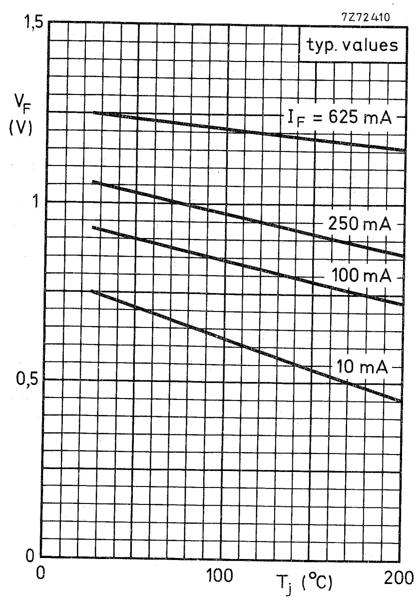


Fig. 12.

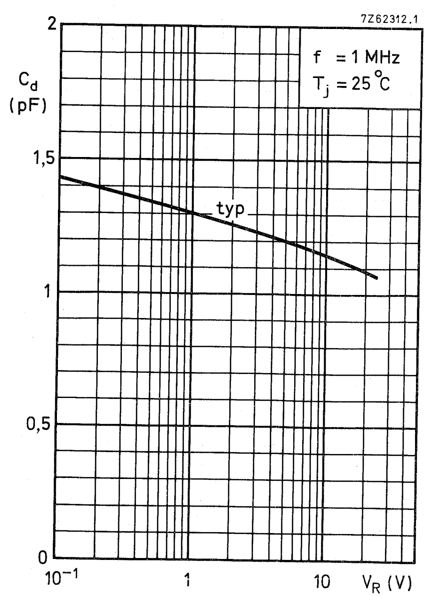


Fig. 13.

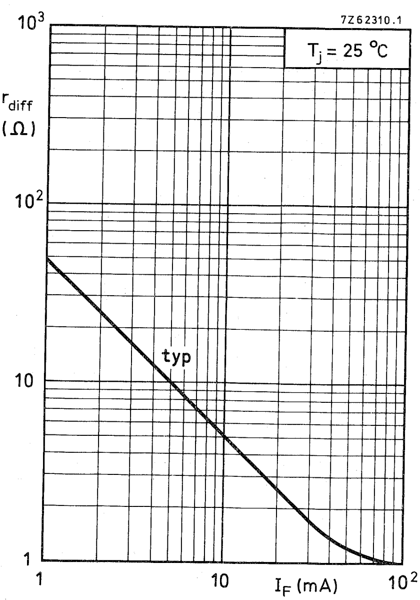


Fig. 14.

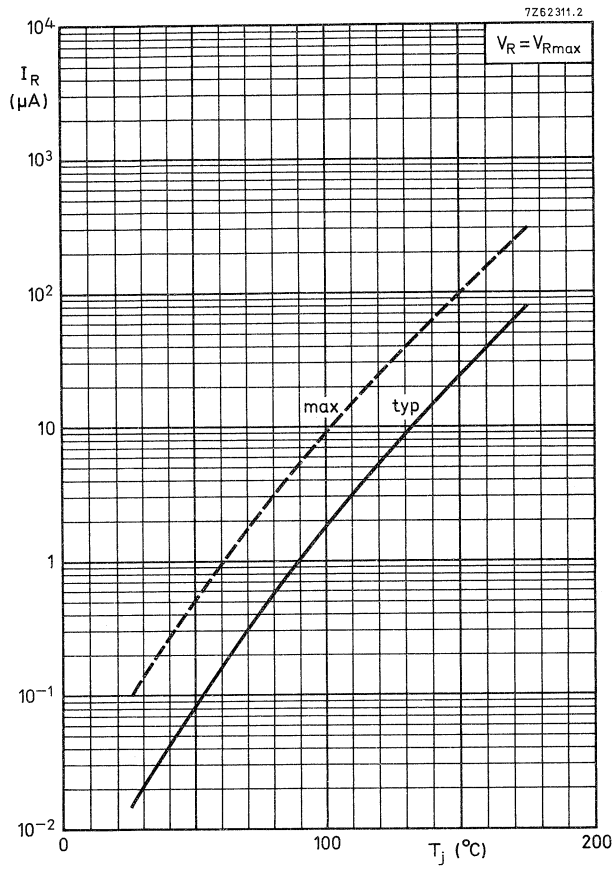

7Z62311.2
$V_R = V_{Rmax}$
I_R (μA)
10^4
10^3
10^2
10
1
10^{-1}
10^{-2}
max
typ
0
100
200
T_j (°C)

Fig. 15.

ULTRA HIGH-SPEED DIODE

Silicon planar epitaxial, ultra-high speed, high conductance diode in a SOD-80 envelope.

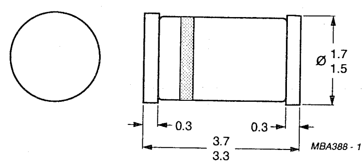
QUICK REFERENCE DATA

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 SOD-80.



The cathode is indicated by a black band

RATINGS

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

Continuous reverse voltage	V_R	max.	60 V
Repetitive peak reverse voltage	V_{RRM}	max.	60 V
Average rectified forward current	$I_{F(AV)}$	max.	300 mA
Forward current	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		max.	1000 mA
Storage temperature	T_{stg}	−65 to + 175 °C	
Junction temperature	T_j	max.	175 °C

THERMAL RESISTANCE

From junction to ambient	$R_{th\ j\text{-}a}$	375 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

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

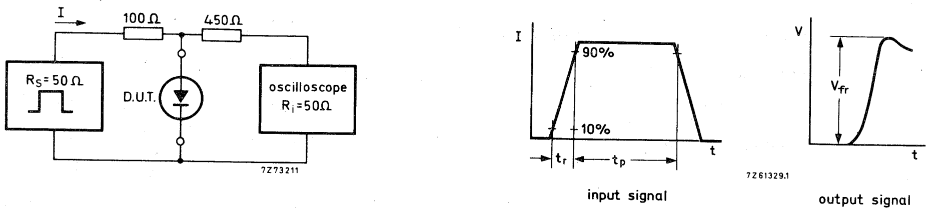
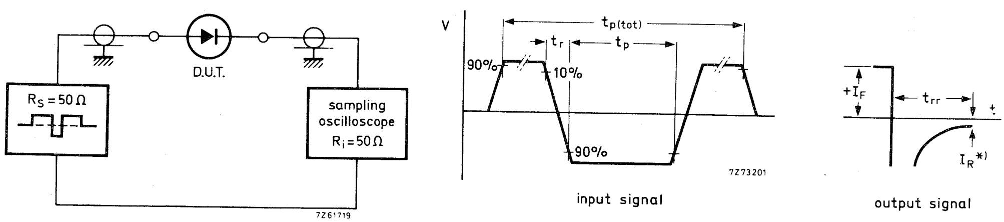


Fig. 2 Test circuit and waveforms; forward recovery voltage.

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 $C \leqslant 20$ 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 (see Fig. 3) — $t_{rr} < 6$ ns



*) I_R = 40 mA

Fig. 3 Test circuit 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 $C \leqslant 1$ 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 (see Fig. 4) — Q_s < 50 pC

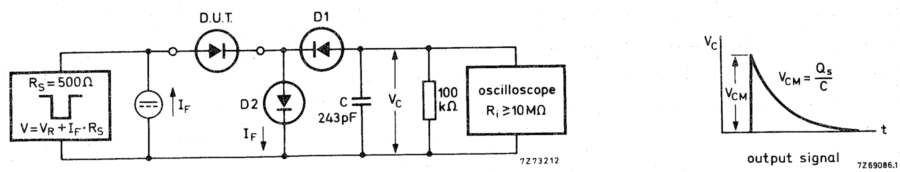


Fig. 4 Test circuit and waveform; recovery charge.

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)

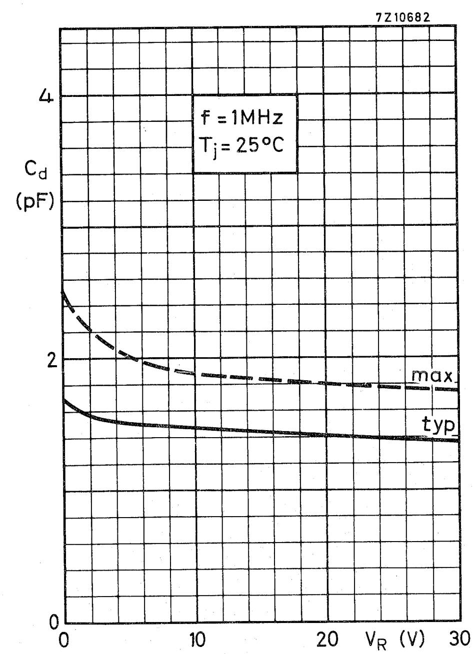


Fig. 5.

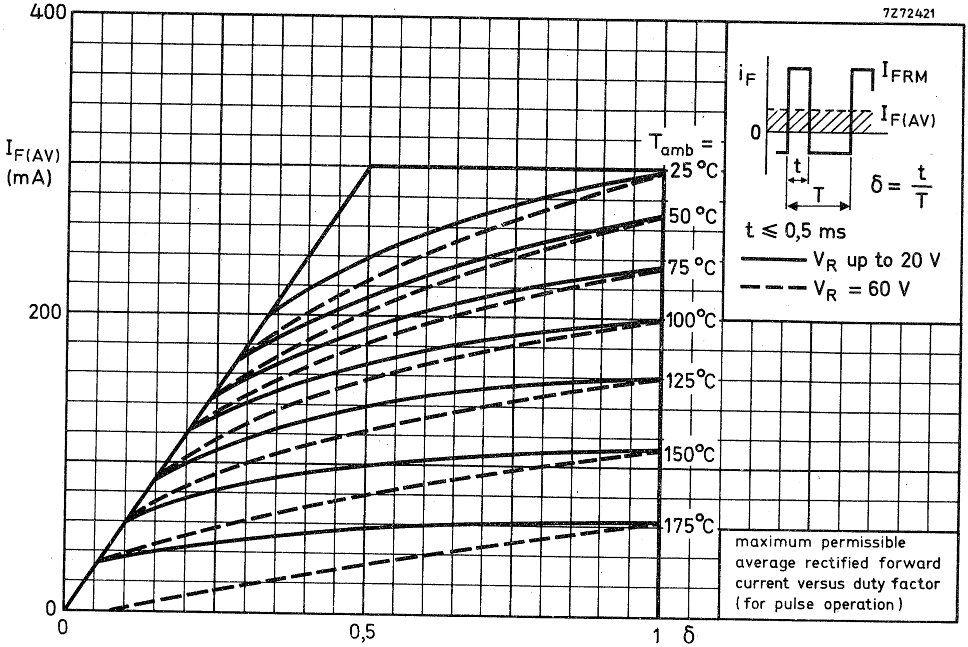

7Z72421
400
200
0
$I_{F(AV)}$
(mA)
0
0,5
1 δ
T_{amb} =
25 °C
50 °C
75 °C
100°C
125°C
150°C
175°C
i_F
I_{FRM}
$I_{F(AV)}$
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible
average rectified forward
current versus duty factor
(for pulse operation)

Fig. 6.

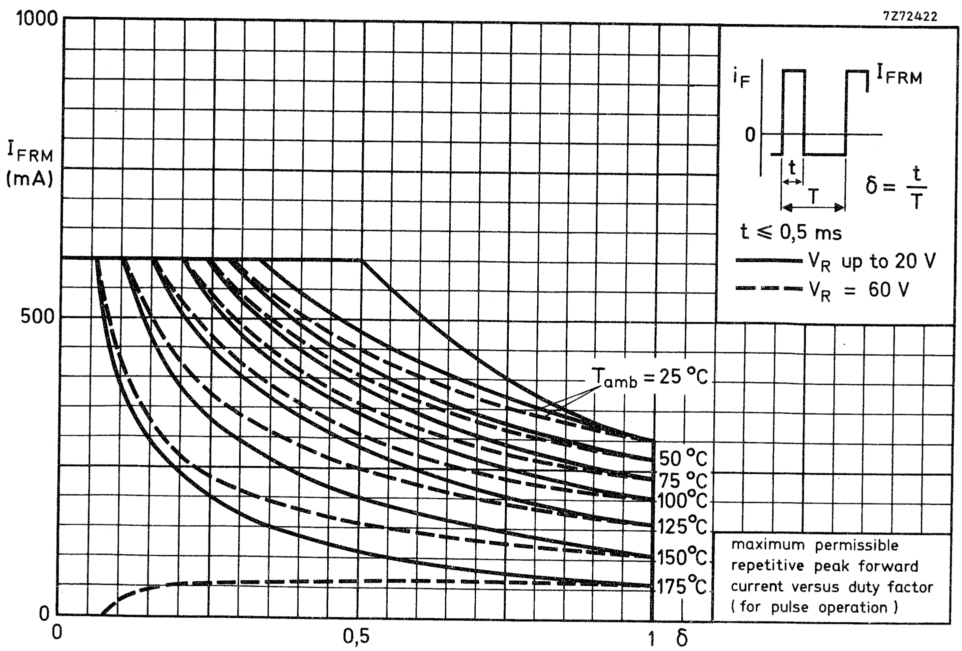

7Z72422
1000
500
0
I_{FRM}
(mA)
0
0,5
1 δ
T_{amb} = 25 °C
50 °C
75 °C
100°C
125°C
150°C
175°C
i_F
I_{FRM}
0
t
T
δ = t/T
t ⩽ 0,5 ms
V_R up to 20 V
V_R = 60 V
maximum permissible
repetitive peak forward
current versus duty factor
(for pulse operation)

Fig. 7.

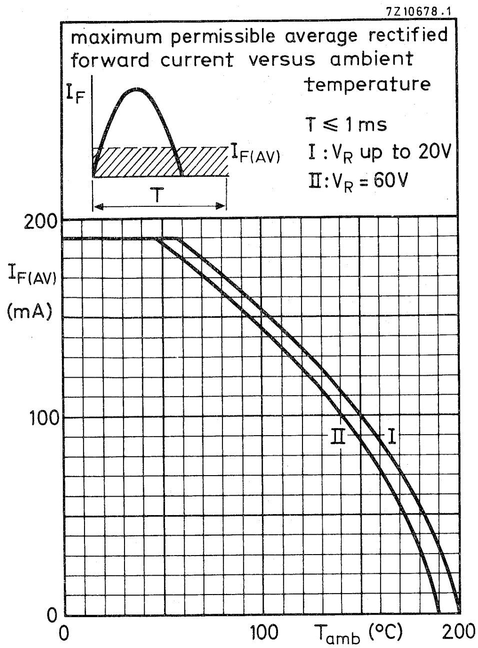


Fig. 8.

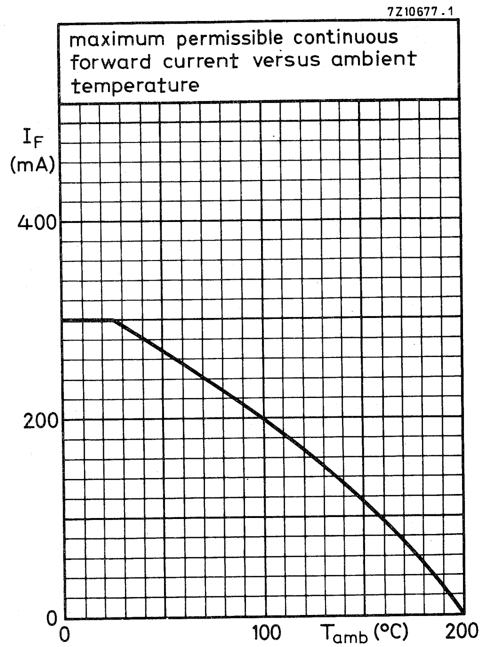


Fig. 9.

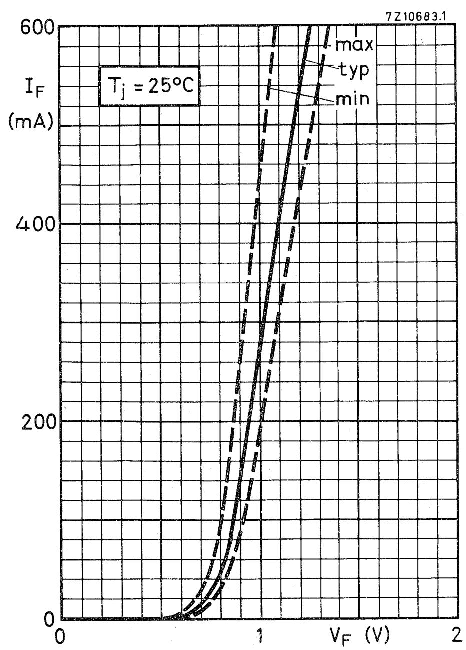


Fig. 10.

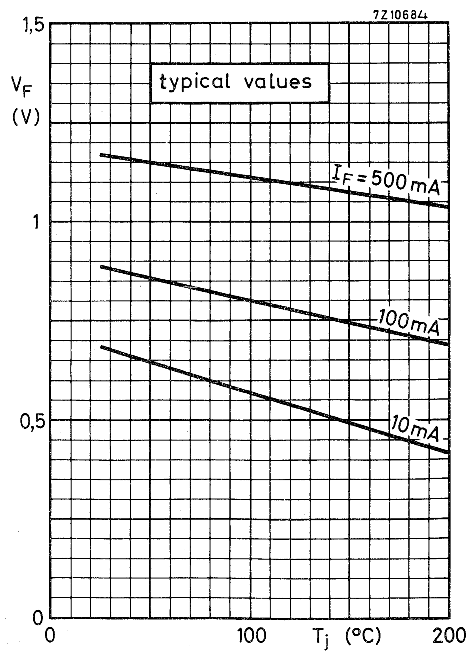


Fig. 11.

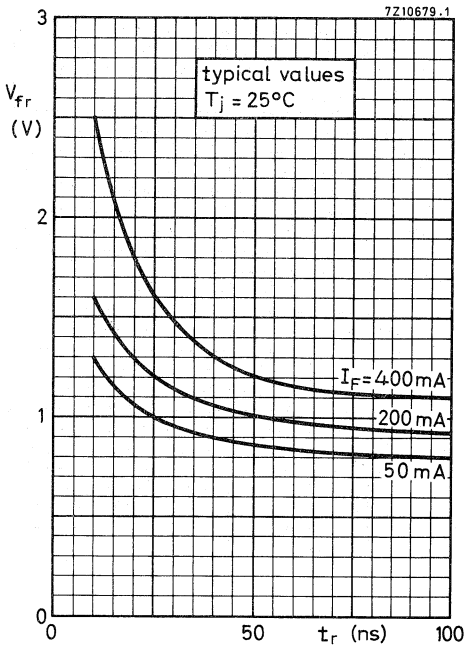


Fig. 12.

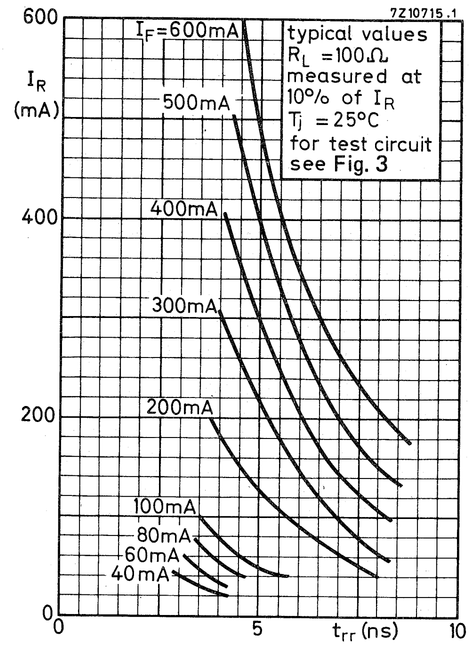


Fig. 13.

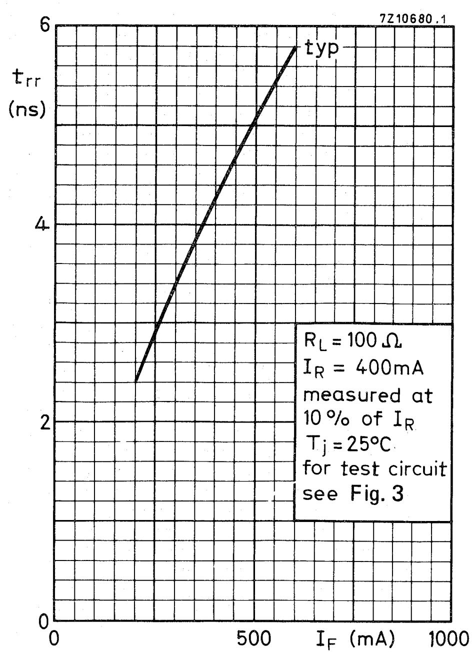


Fig. 14.

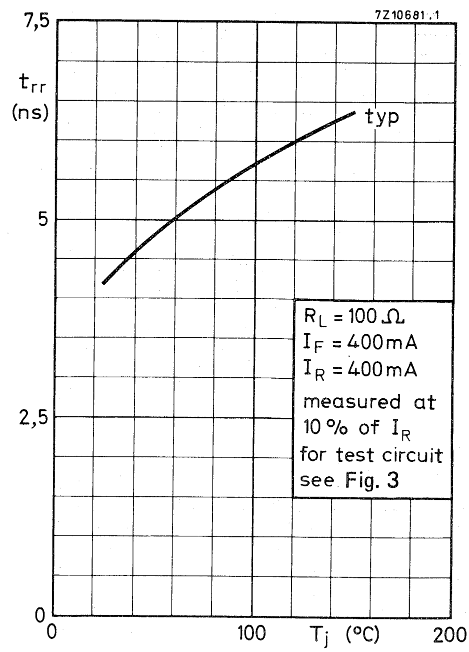


Fig. 15.

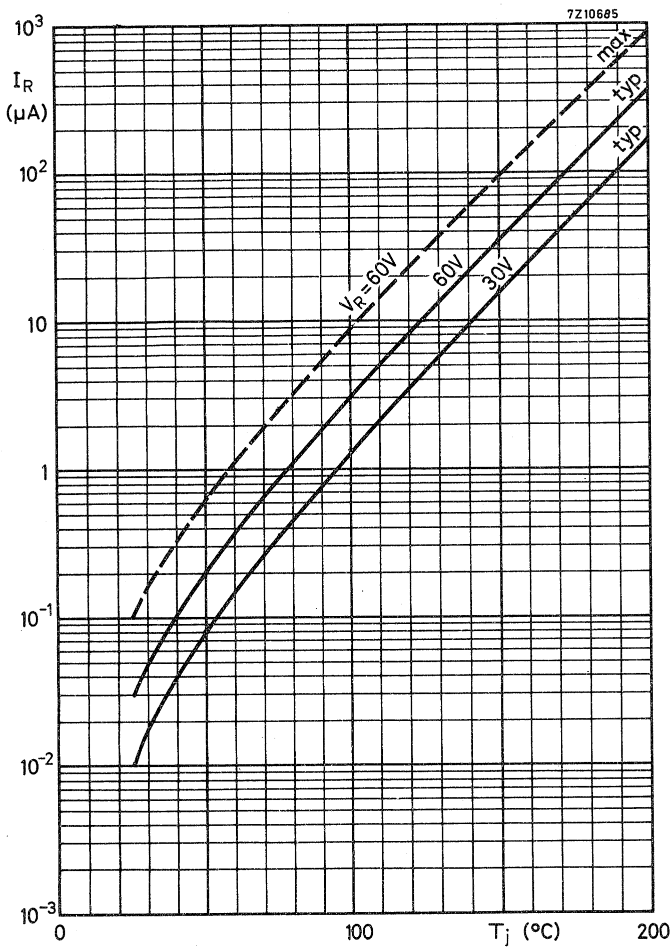

7Z10685
I_R (μA)
10^3
10^2
10
1
10^{-1}
10^{-2}
10^{-3}
0
100
T_j (°C)
200
max
typ
typ
V_R = 60V
60V
30V

Fig. 16.

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.	450	mA
Junction temperature	T_j	max.	150	°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

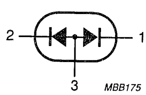
MECHANICAL DATA

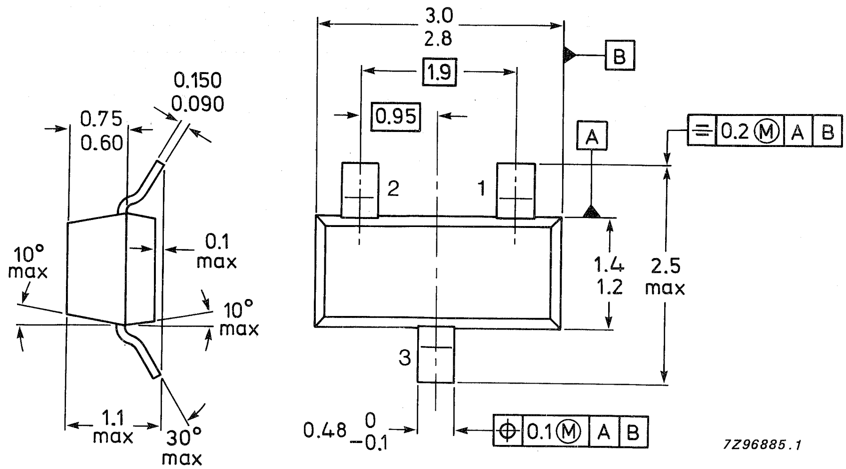
Dimensions in mm

Fig. 1 SOT-23.

Marking code

BAW56 = A1p





TOP VIEW

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.	215 mA
Forward current (DC)	I_F	max.	215 mA
Repetitive peak forward current	I_{FRM}	max.	450 mA
Non-repetitive peak forward current (per crystal)			
t = 1 μs	I_{FSM}	max.	2 A
t = 1 ms	I_{FSM}	max.	1 A
t = 1 s	I_{FSM}	max.	0,5 A
Storage temperature range	T_{stg}		−65 to + 150 °C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE**

From junction to ambient**	$R_{th\ j\text{-}t}$	=	430 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 see Fig. 2	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 8 mm x 10 mm x 0,7 mm.

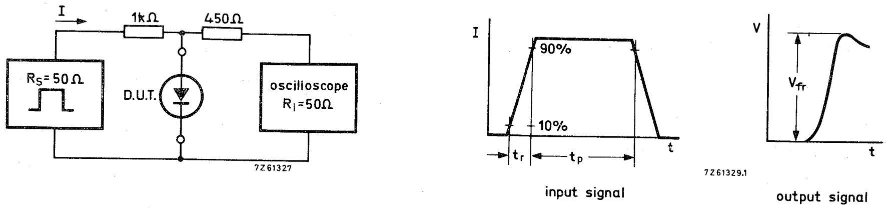


Fig. 2 Test circuit and waveforms; forward recovery voltage.

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 see Fig. 3 t_{rr} < 6 ns

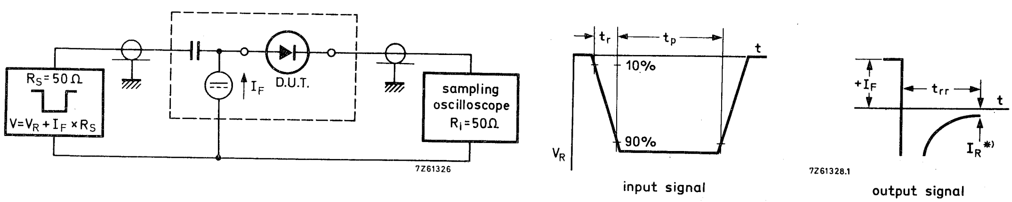


Fig. 3 Test circuit and waveforms; reverse recovery time.

*) 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 see Fig. 4 Q_s < 45 pC

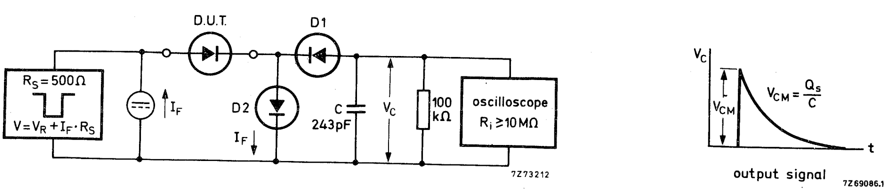


Fig. 4 Test circuit and waveform; recovery charge.

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

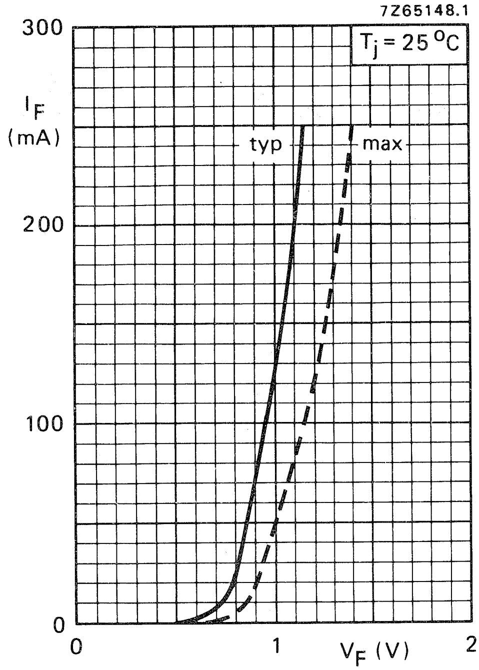


Fig. 5.

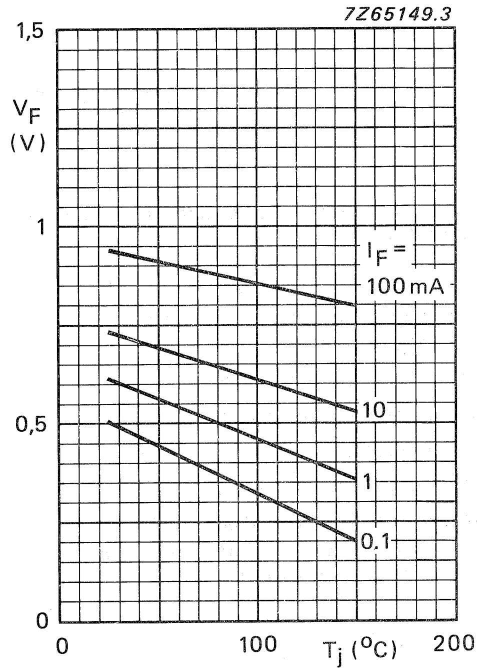


Fig. 6 Typical values.

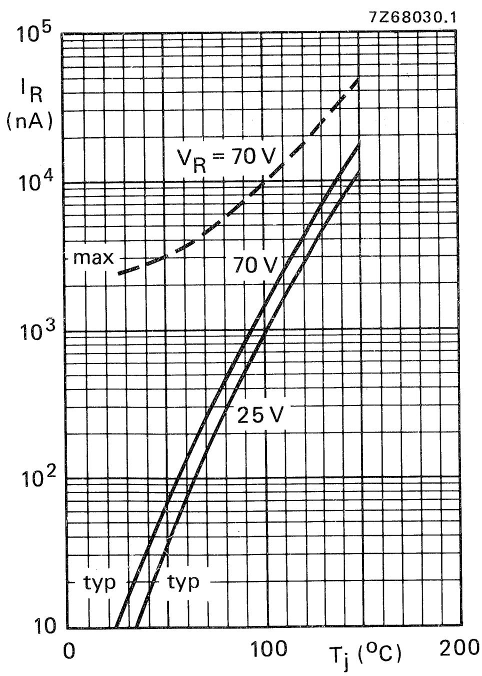


Fig. 7.

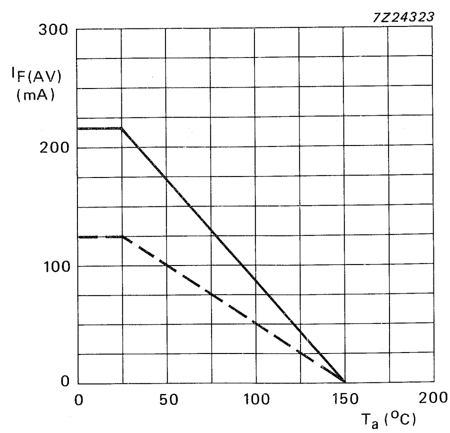


Fig. 8 ——— single diode;
– – – – double diode, equally loaded.

HIGH-SPEED SILICON DIODE

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

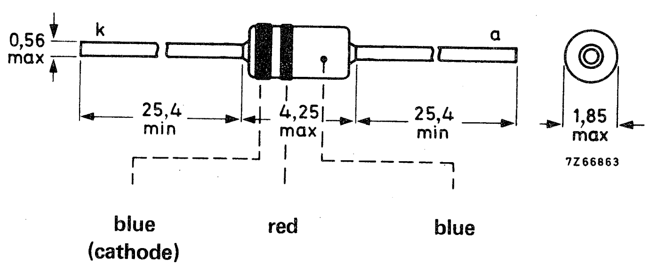
QUICK REFERENCE DATA

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.

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 [1]
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 at maximum lead length	$R_{th\ j-a}$	=	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 = 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) 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:

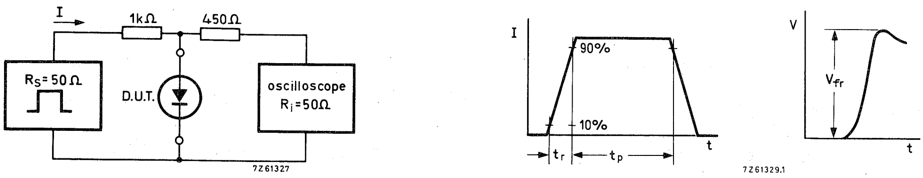


Fig. 2.

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:

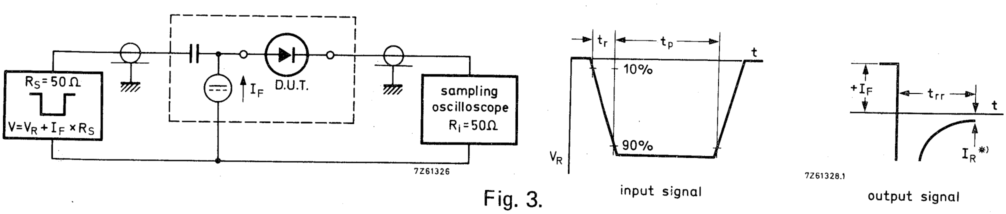


Fig. 3.

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	

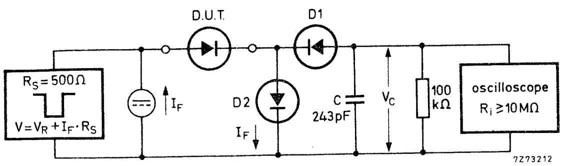
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

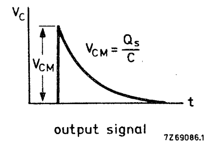
CHARACTERISTICS (continued) $T_j = 25\ ^oC$

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

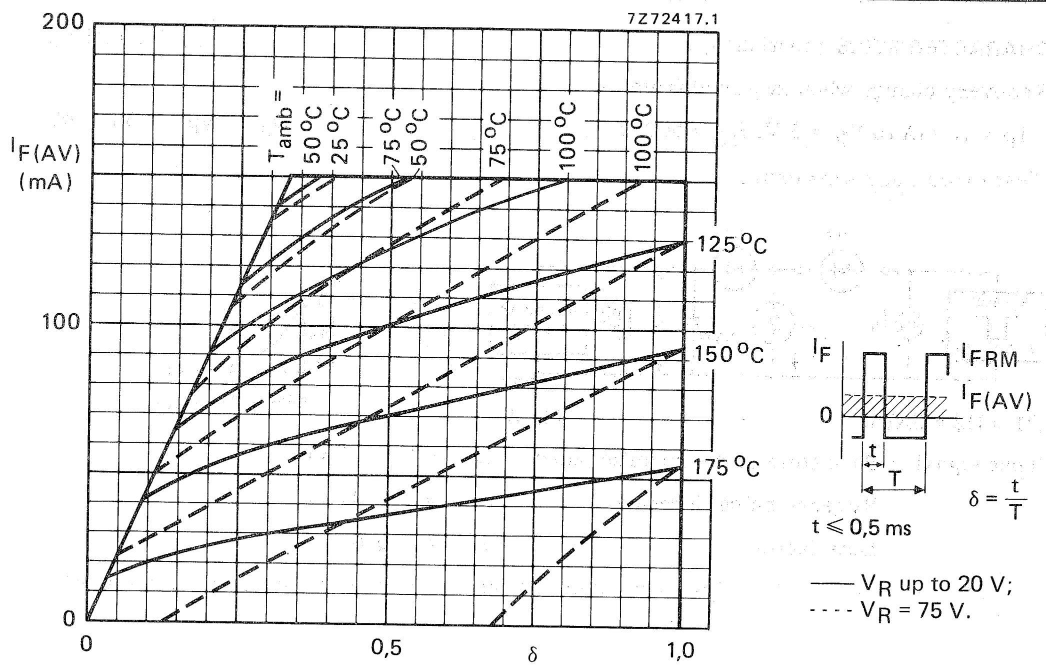


Fig. 5 Maximum permissible average rectified forward current as a function of the duty factor (pulse operated).

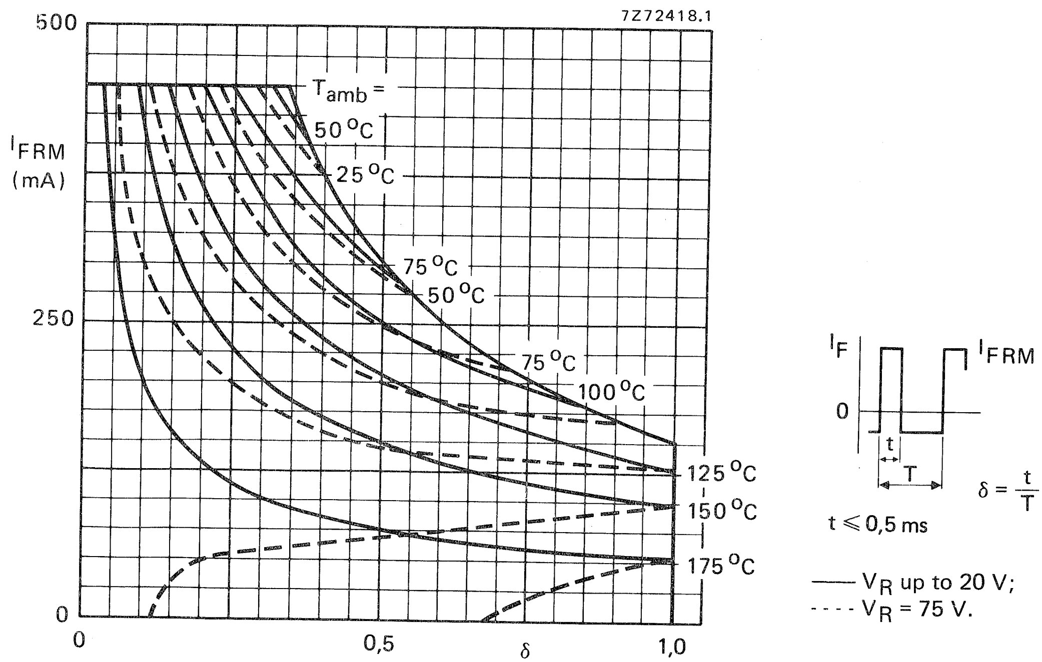


Fig. 6 Maximum permissible repetitive peak forward current as a function of the duty factor (pulse operated).

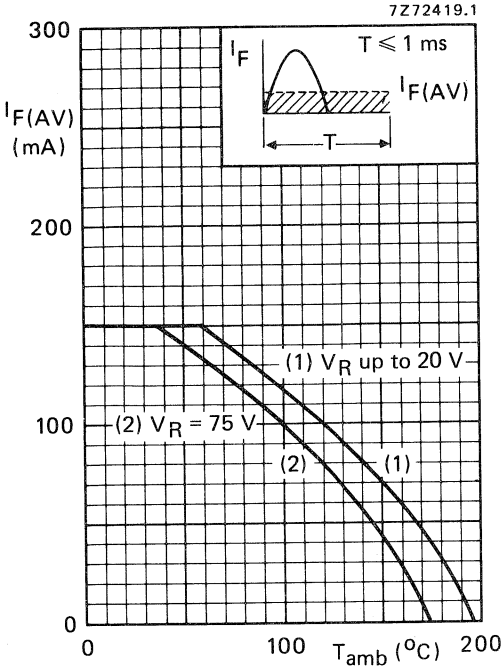


Fig. 7 Maximum permissible average rectified forward current.

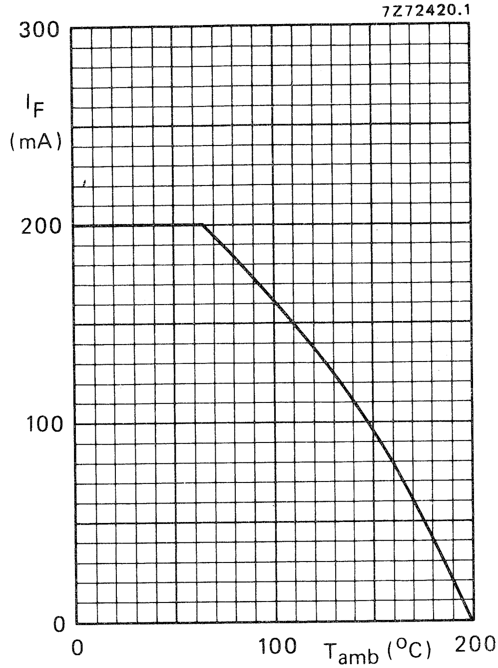


Fig. 8 Maximum permissible continuous forward current.

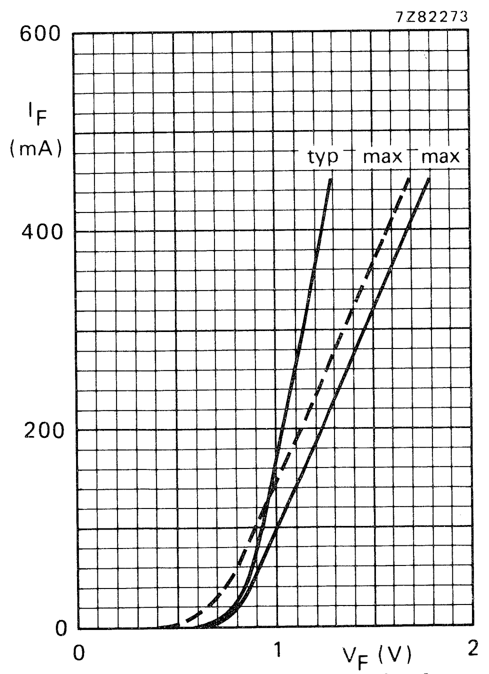


Fig. 9 Forward current as a function forward voltage. —— T_j = 25 °C; – – – T_j = 175 °C.

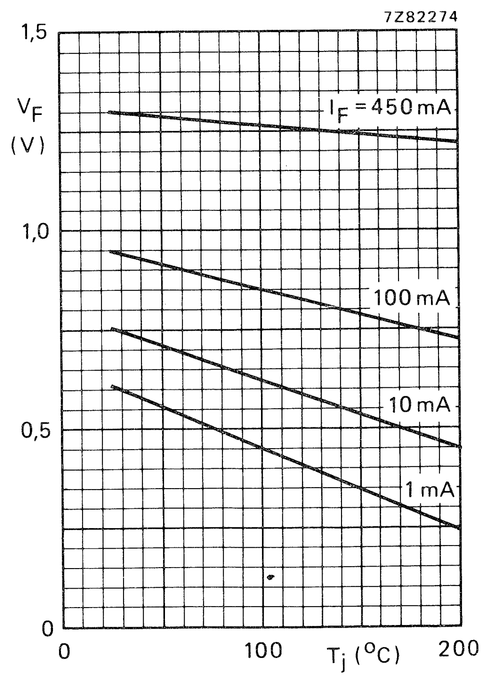
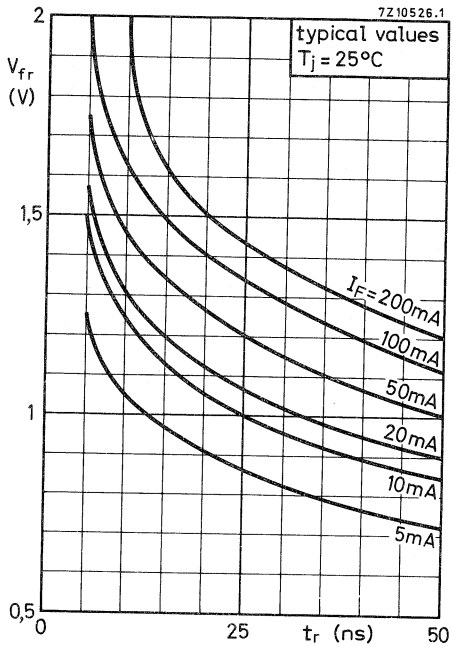
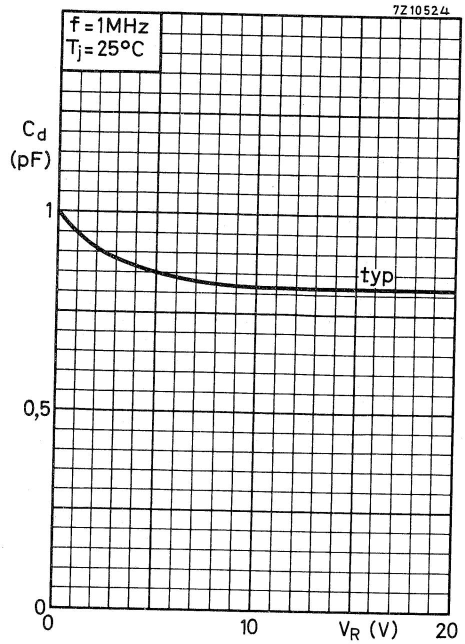
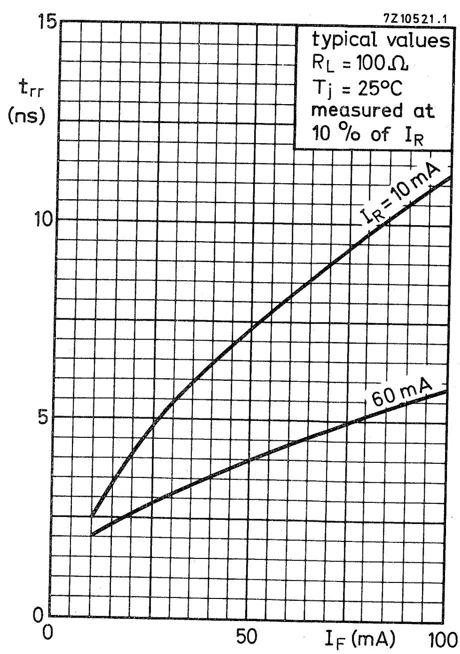
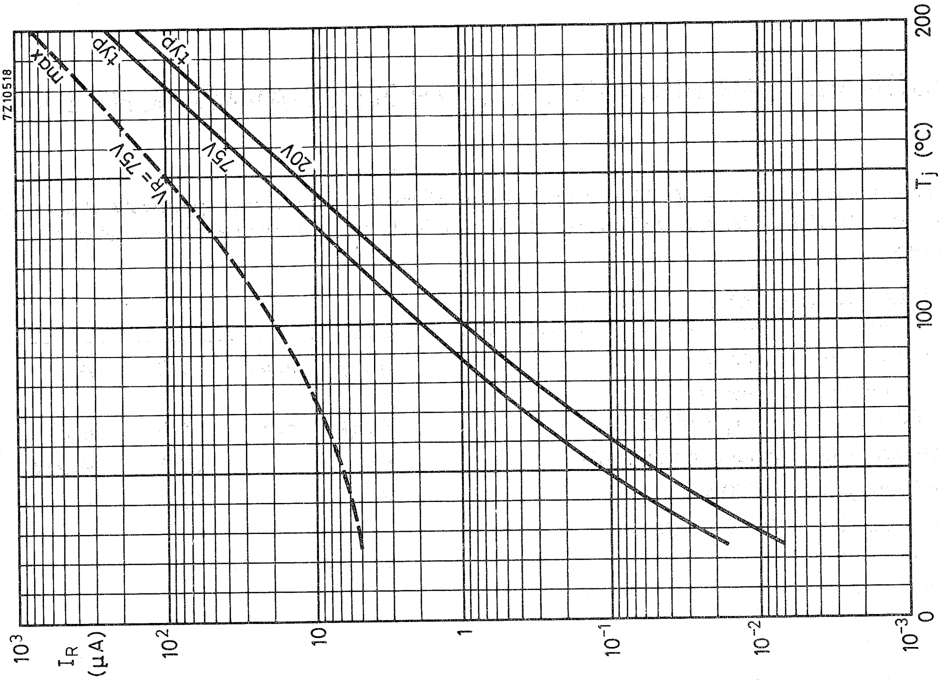


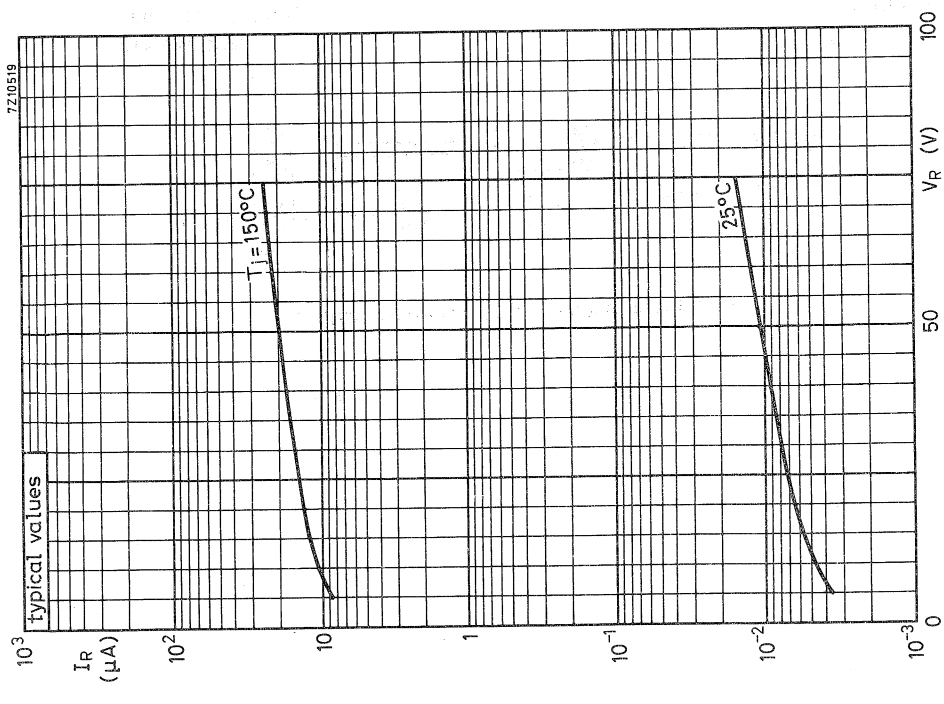
Fig. 10 Typical values forward voltage as a function of junction temperature.


7Z10526.1
typical values
Tj = 25°C
Vfr
(V)
2
1,5
1
0,5
0
25
tr (ns)
50
IF = 200mA
100mA
50mA
20mA
10mA
5mA


7Z10524
f = 1MHz
Tj = 25°C
Cd
(pF)
1
0,5
0
10
VR (V)
20
typ


7Z10521.1
typical values
RL = 100 Ω
Tj = 25°C
measured at
10 % of IR
trr
(ns)
15
10
5
0
50
IF (mA)
100
IR = 10 mA
60 mA


7Z10518
max
typ
typ
$V_R = 75V$
75V
20V
T_j (°C)
0
100
200
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)
0
50
100
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.

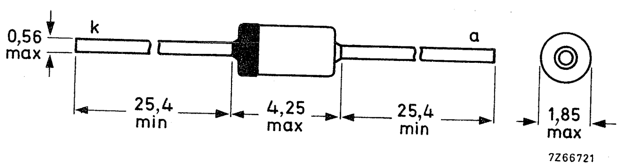
QUICK REFERENCE DATA

Repetitive peak forward current	I_{FRM}	max.	0,8	A
Repetitive peak reverse energy $t_p \geq 50\ \mu s$; $f \leq 20$ 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

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

Dimensions in mm
Mark: BAX12



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.	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 with fig. 4. 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:

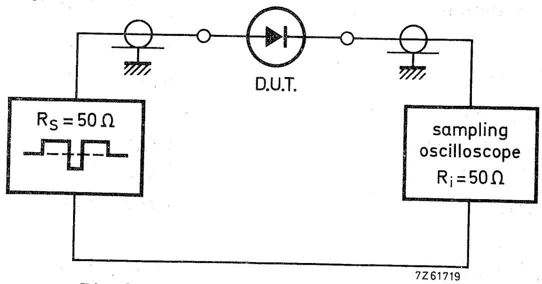


Fig. 2 Test circuit for t_{rr} measurement.

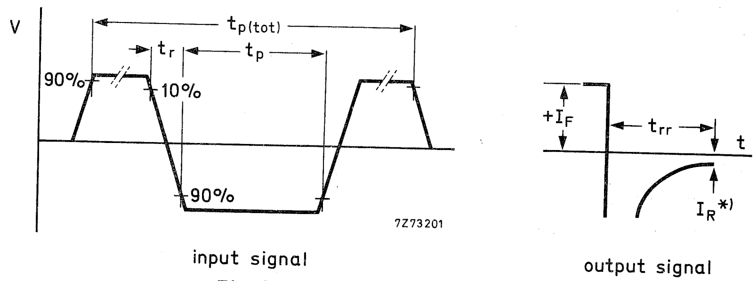


Fig. 3 Waveforms t_{rr} measurement.

*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.

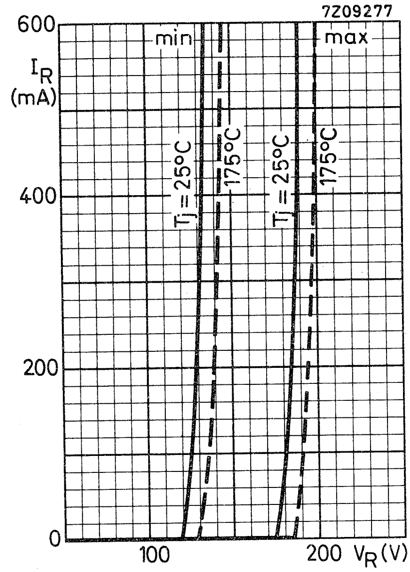


Fig. 4.

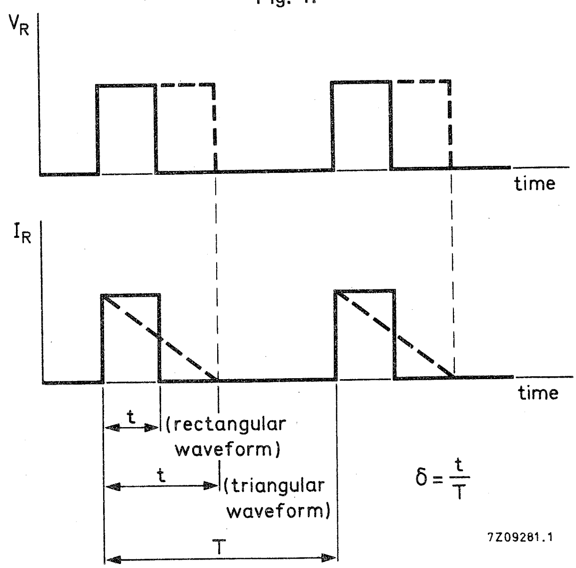


Fig. 5.

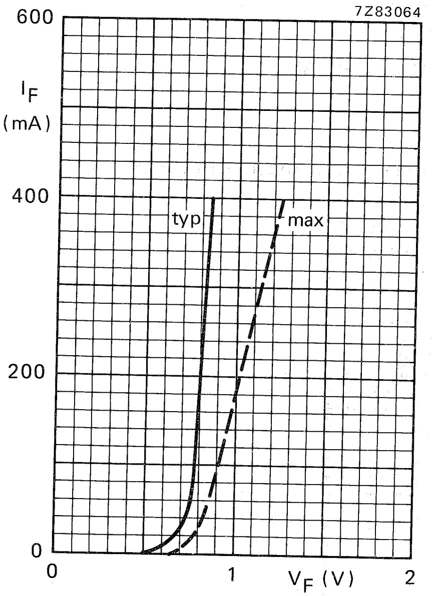


Fig. 6 I_F as a function of V_F at T_j = 25 °C.

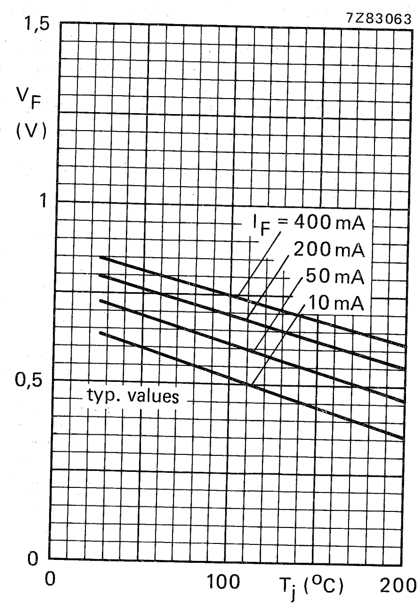


Fig. 7 V_F as a function of T_j.

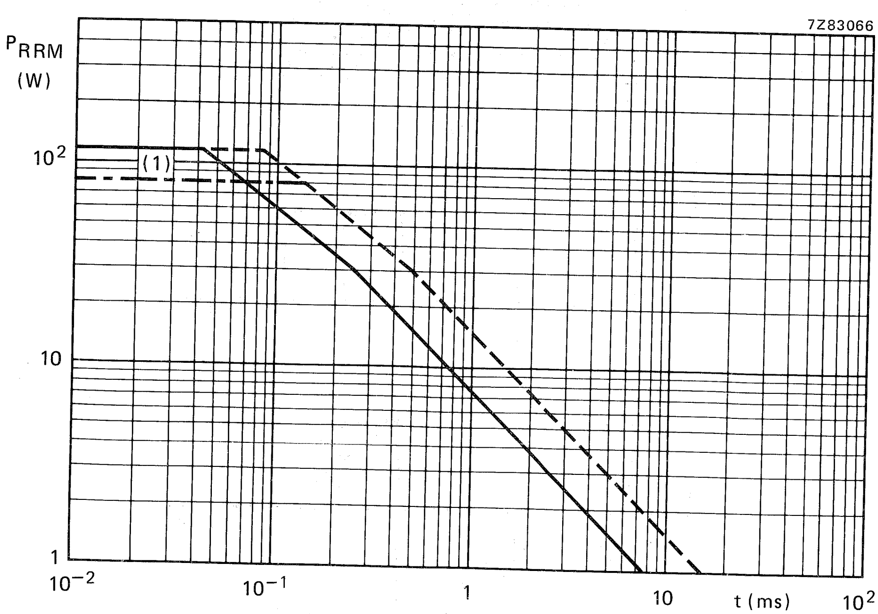


Fig. 8 Maximum permissible repetitive peak reverse power as a function of the pulse duration $T \geqslant 50$ ms; T_j = 25 °C. ——— rectangular waveform; $\delta \leqslant 0,01$; – – – triangular waveform; $\delta \leqslant 0,02$.

(1) Limited by I_{RRM} = 600 mA.

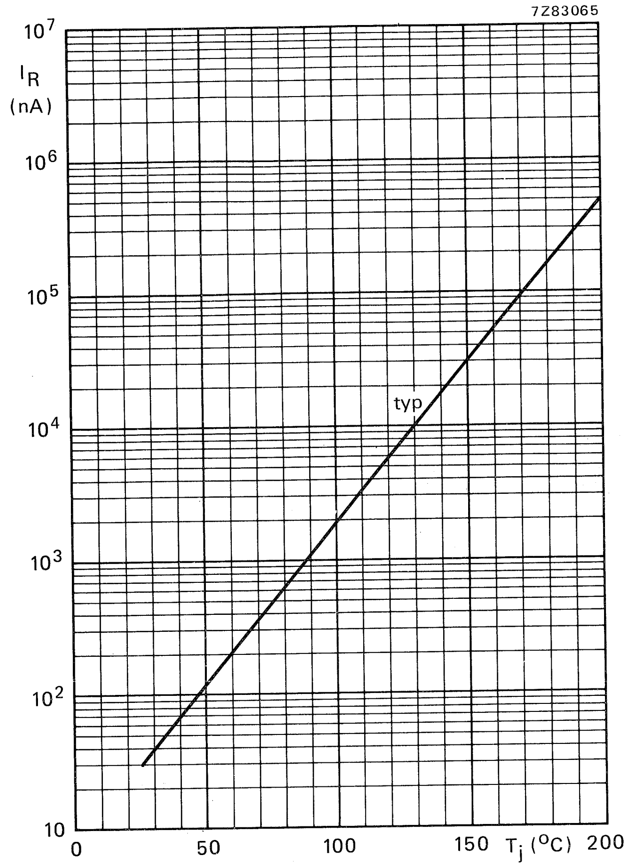


Fig. 9 Typical values reverse current as a function of junction temperature at $V_R = 90$ V.

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.

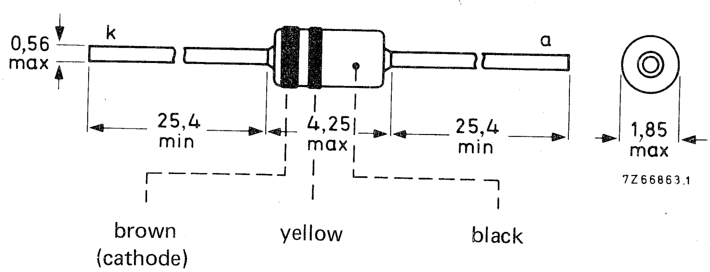
QUICK REFERENCE DATA

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).



Diodes may be either type-branded or colour-coded

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		typ.	20 pF
V_R = 0; f = 1 MHz	C_d	<	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:

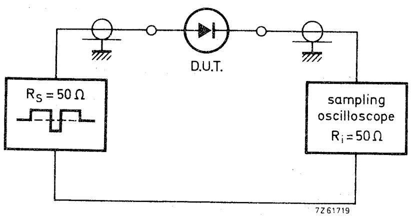


Fig. 2.

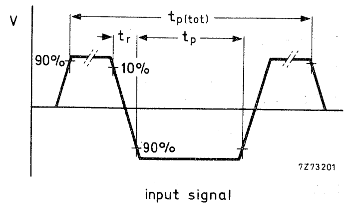


Fig. 3.

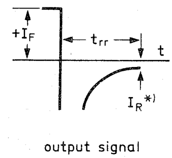


Fig. 4.

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)

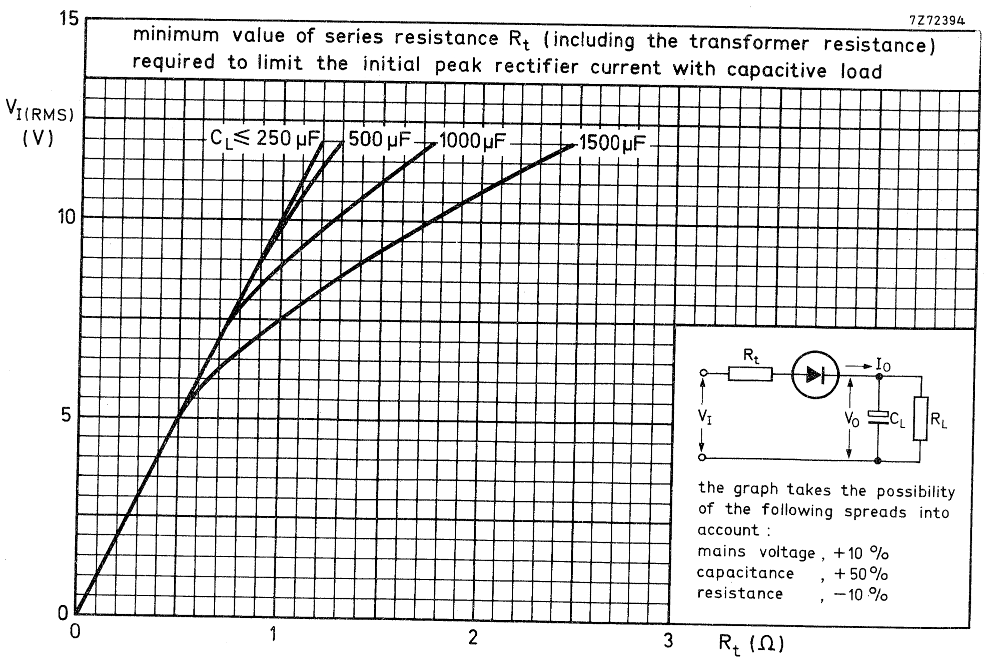


Fig. 5.

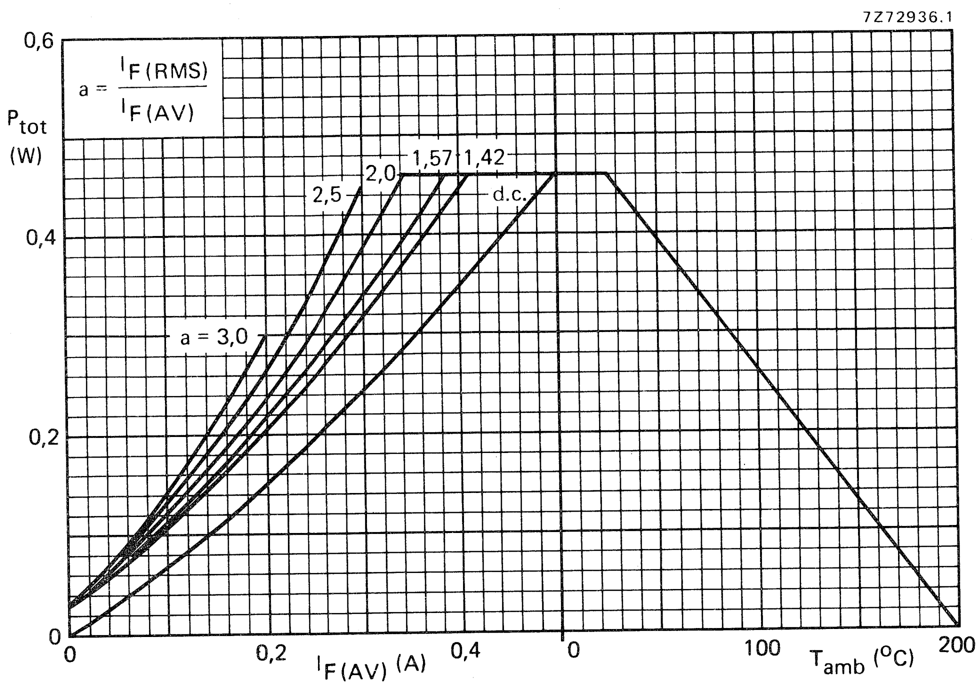


Fig. 6.

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.

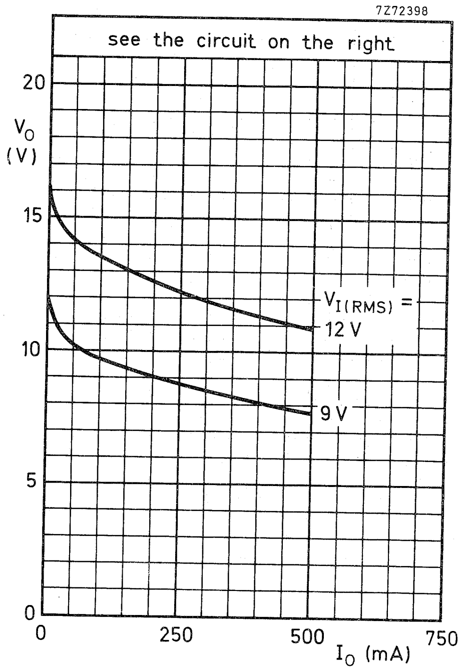


Fig. 7.

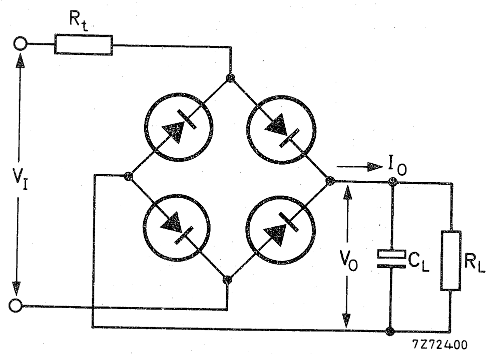


Fig. 8 Test circuit.

V_I (V)	R_t (Ω)	C_L (μF)
12	1,7	1000
9	1,1	1000

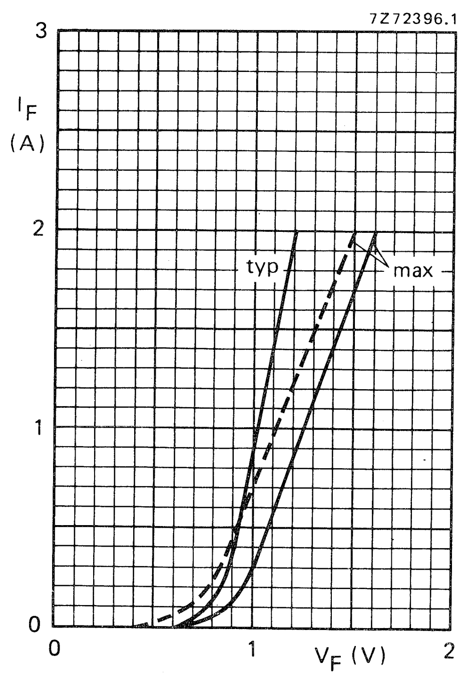


Fig. 9 Forward voltage as a function of the forward current.
—— T_j = 25 °C; – – – T_j = 150 °C.

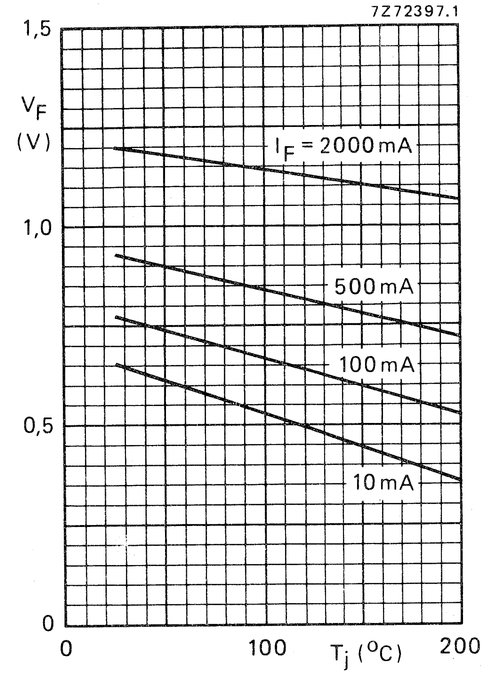


Fig. 10 Typical values forward voltage as a function of junction temperature.

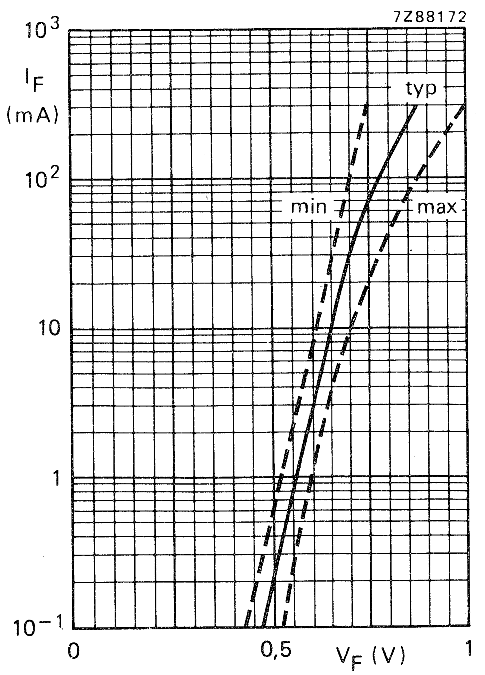


Fig. 11 Forward voltage as a function of the forward current. T_j = 25 °C.

GENERAL PURPOSE DIODE

General purpose diode in a DO-35 in envelope primarily intended for rectifier applications

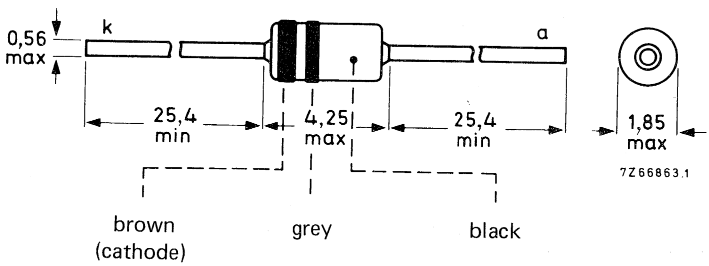
QUICK REFERENCE DATA

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).



Diodes may be either type-branded or colour coded

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 pF
		<	35 pF

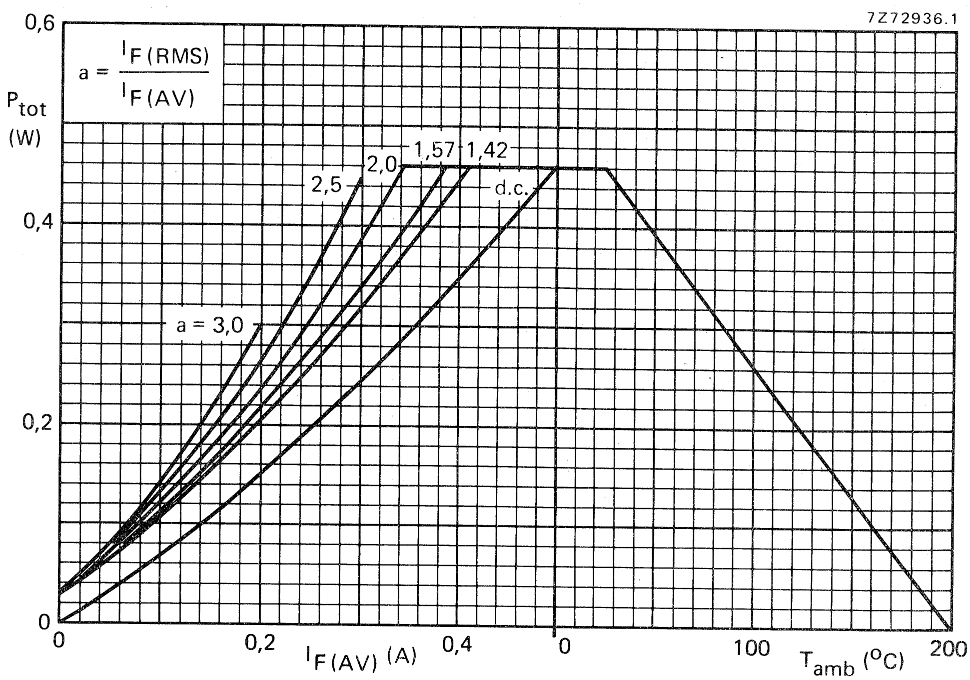


Fig. 2.

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.

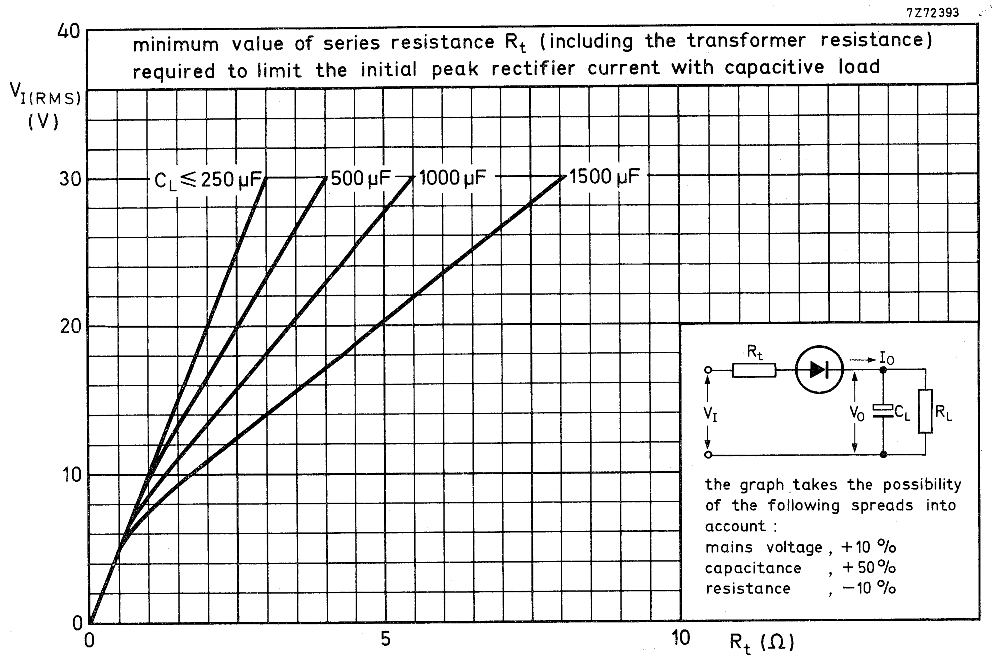


Fig. 3.

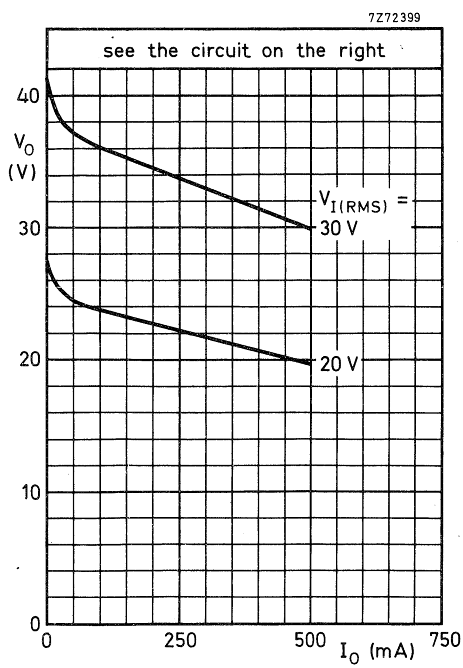


Fig. 4 Output voltages.

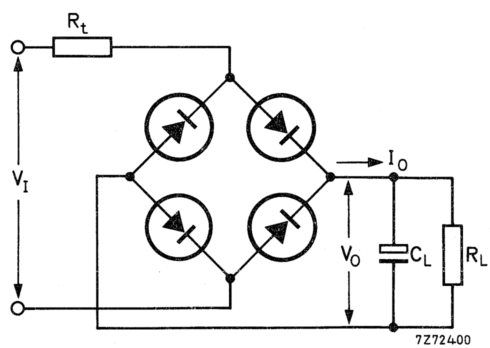


Fig. 5 Test circuit.

V_I (V)	R_t (Ω)	C_L (μF)
30	5,6	1000
20	3,4	1000

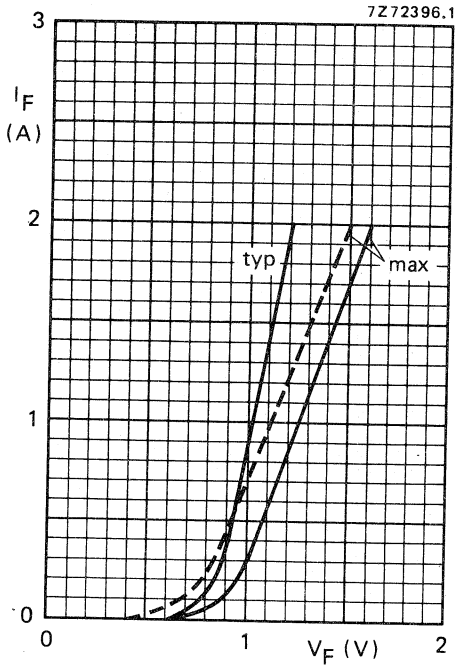


Fig. 6 Typical and maximum values forward current as a function of the forward voltage.
——— T_j = 25 °C; – – – – T_j = 150 °C.

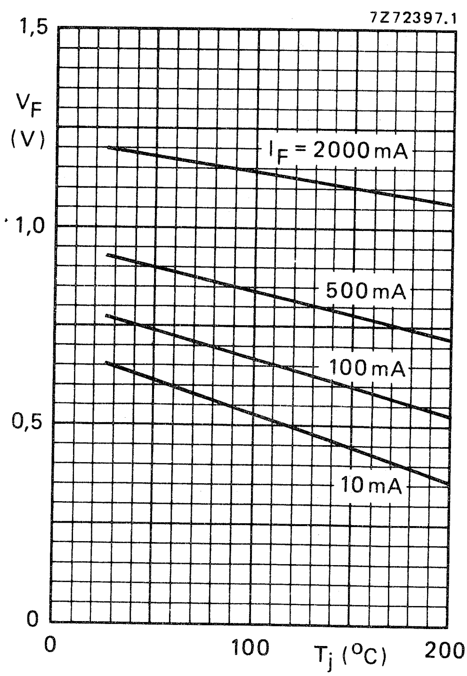


Fig. 7 Typical values forward voltage as a function of junction temperature.

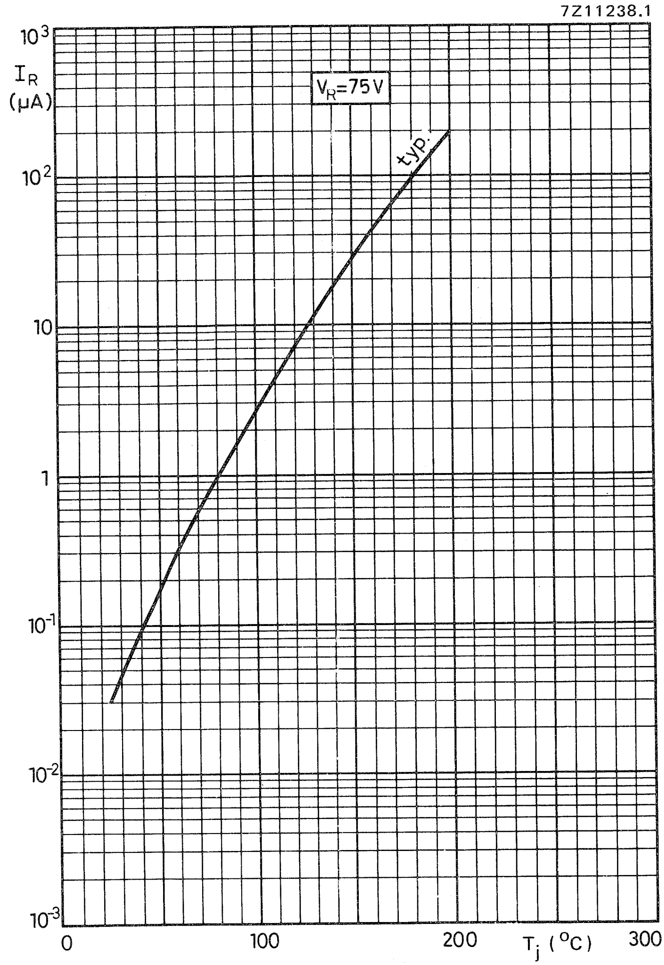


Fig. 8 Typical value reverse current as a function of junction temperature.

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.

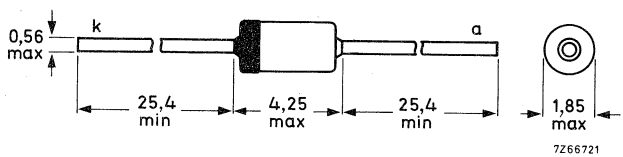
QUICK REFERENCE DATA

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 (SOD27)



The marking band indicates the cathode.
The diodes are type branded.

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; $T_j = 25\ ^oC$	I_{FSM}	max.	1 A
Total power dissipation up to $T_{amb} = 25\ ^oC$	P_{tot}	max.	400 mW
Storage temperature	T_{stg}	−65 to +175	^oC
Junction temperature	T_j	max.	175 ^oC

THERMAL RESISTANCE

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

CHARACTERISTICS

$T_j = 25\ ^oC$ 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* $I_R = 100\ \mu A$	$V_{(BR)R}$	> 150	V
Reverse current			
$V_R = 120$ V	I_R	< 100	nA
$V_R = 120$ V, $T_j = 150\ ^oC$	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.

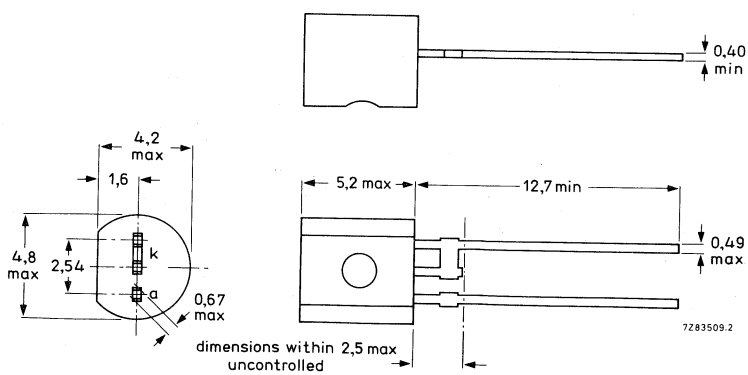
QUICK REFERENCE DATA

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 %

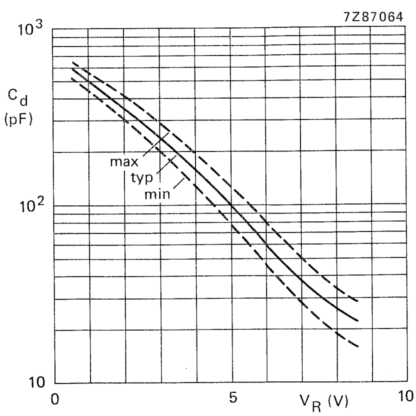


Fig. 2 Diode capacitance at f = 1 MHz as a function of the reverse voltage.

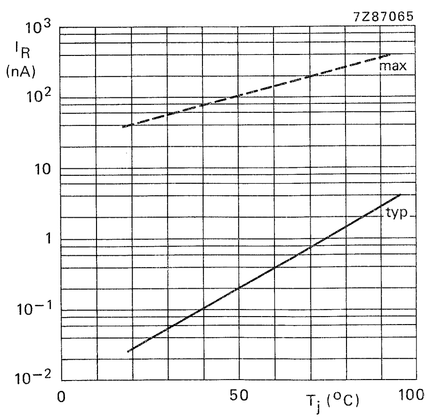


Fig. 3 Reverse current as a function of junction temperature at V_R = 12 V.

SILICON VARIABLE CAPACITANCE DIODE

Planar-diffused diode in a DO-35 envelope intended for automatic frequency control in radio and television receivers.

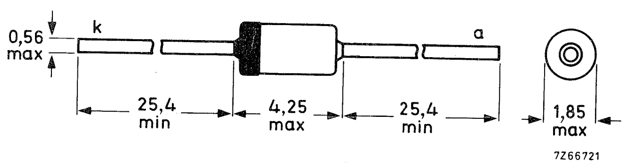
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	15	V
Junction temperature	T_j	max.	200	^oC
Reverse current at V_R = 15 V; T_j = 150 ^oC	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 (SOD27)



The coloured band indicates the cathode
The diodes are type-branded

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

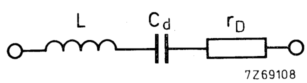
Continuous reverse voltage	V_R	max.	15	V
Forward current (d.c.)	I_F	max.	200	mA
Storage temperature	T_{stg}		−65 to +200	°C
Junction temperature	T_j	max.	200	°C

CHARACTERISTICS

$T_j = 25$ °C unless otherwise specified

Reverse current				
$V_R = 15$ V; $T_j = 150$ °C	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	$\frac{C_d\ (V_R = 4\ V)}{C_d\ (V_R = 10\ V)}$	≥	1,3	
Series resistance at f = 200 MHz				
$V_R = 4$ V	r_D	typ.	0,9	Ω
		<	1,5	Ω

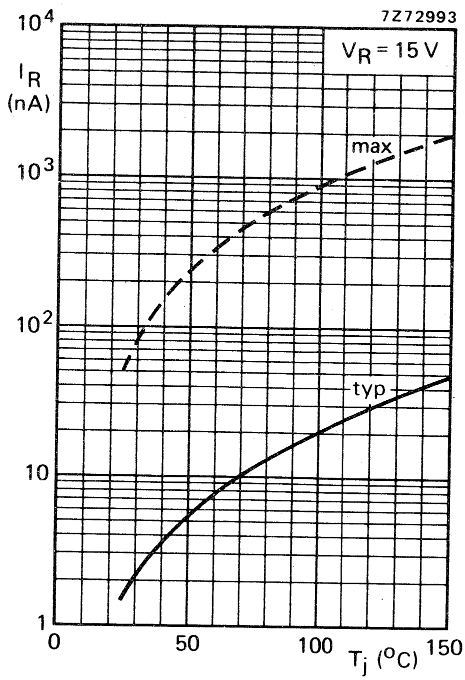
Simplified equivalent circuit:

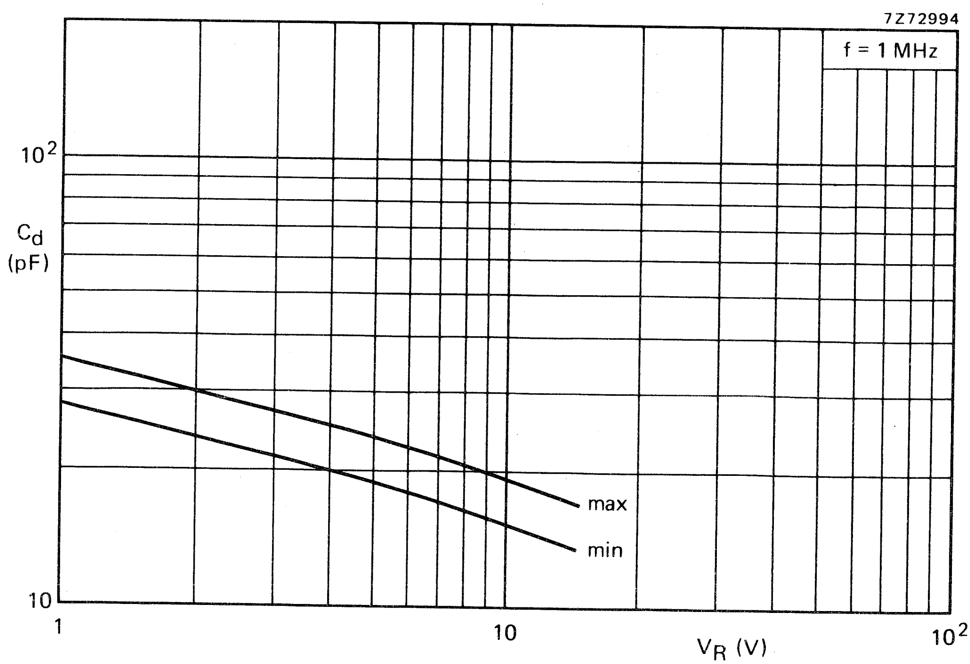


L = lead inductance ≈ 6 nH
r_D = series resistance
C_d = diode capacitance (see next page)

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.

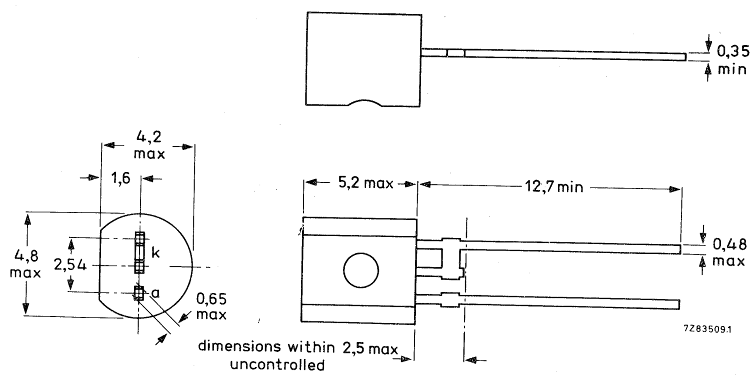
QUICK REFERENCE DATA

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 %

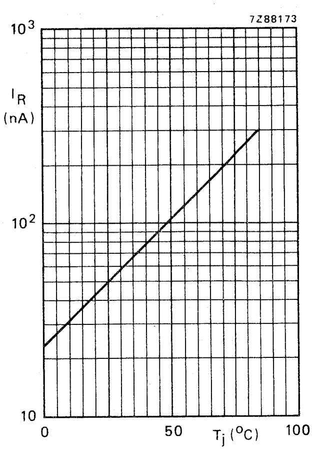


Fig. 2 Maximum values. Reverse current as a function of the junction temperature. V_R = 30 V.

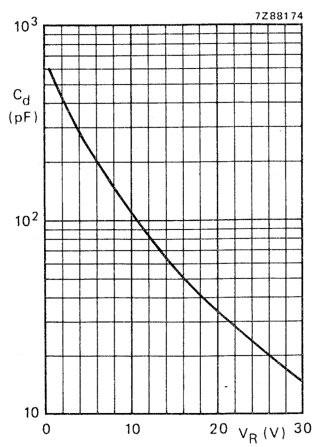


Fig. 3 Typical diode capacitance as a function of reverse voltage; f = 1 MHz.

DESCRIPTION

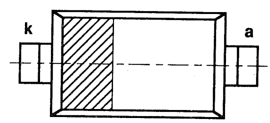
The BB131 is a silicon variable capacitance diode in planar technology, intended for use as a coupling diode in VHF tuners. The device is encapsulated in the ultra-small plastic SMD package, SOD323.

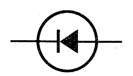
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_R	reverse current	V_R = 30 V	–	10	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	8	17	pF
		V_R = 28 V; f = 1 MHz	0.7	1.055	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	12	16	
R_s	series resistance	f = 470 MHz; note 1	–	3	Ω

Note

1. V_R is the value at which C_d = 9 pF.





Marking code: BB131 = P1.

Fig.1 Simplified outline (SOD323) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	150	°C
T_{amb}	ambient operating temperature range		–55	125	°C

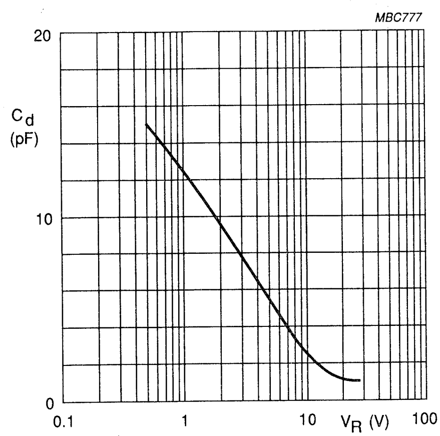
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 30 V	–	10	nA
		V_R = 30 V; T_{amb} = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	8	17	pF
		V_R = 28 V; f = 1 MHz	0.7	1.055	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	12	16	
R_s	series resistance	f = 470 MHz; note 1	–	3	Ω

Note

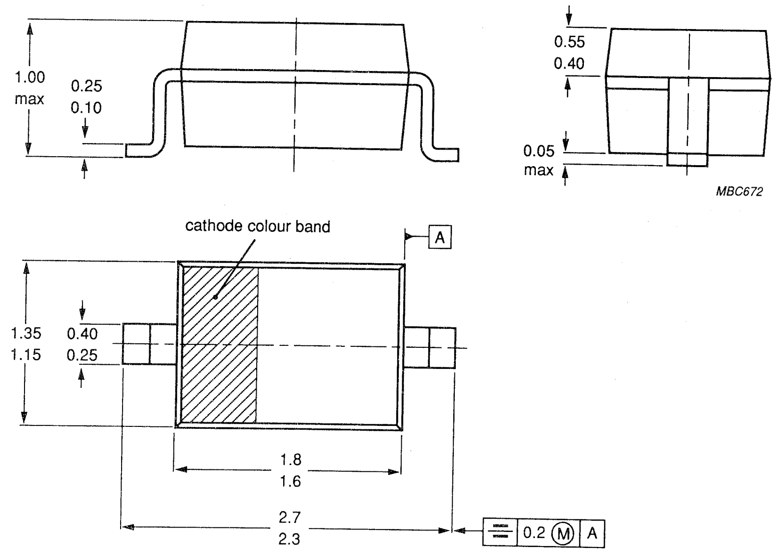
1. V_R is the value at which C_d = 9 pF.



f = 1 MHz; T_{amb} = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a green bar.

Fig.3 SOD323.

VHF variable capacitance diode | BB132

DESCRIPTION

The BB132 is a silicon variable capacitance diode in planar technology, with a very high capacitance ratio. It is intended for application in VHF tuners. The device is encapsulated in the ultra-small plastic SMD package, SOD323. A feature of this diode is the excellent matching performance, achieved by the Direct Matching Assembly procedure.

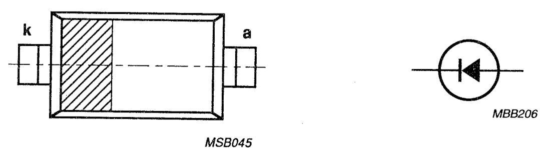
The diodes are delivered on tape in several matched groups, and are also available unmatched upon request.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_R	reverse current	$V_R = 30$ V	–	10	nA
C_d	diode capacitance	$V_R = 0.5$ V; f = 1 MHz	60	75	pF
		$V_R = 28$ V; f = 1 MHz	2.3	2.75	pF
$C_{0.5\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	24	30	
R_s	series resistance	f = 100 MHz; note 1	–	2	Ω

Note

1. V_R is the value at which $C_d = 30$ pF.



Marking code: BB132 = P2.

Fig.1 Simplified outline (SOD323) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	150	°C
T_{amb}	ambient operating temperature range		–55	125	°C

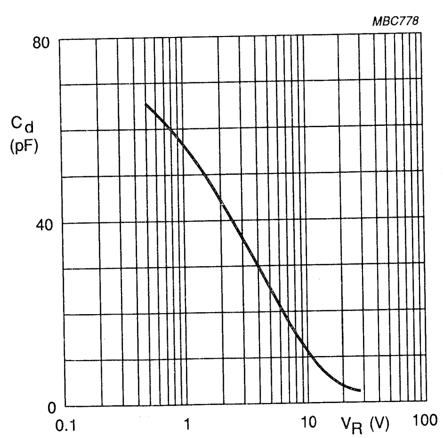
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 30 V	–	10	nA
		V_R = 30 V; T_{amb} = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	60	75	pF
		V_R = 28 V; f = 1 MHz	2.3	2.75	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	24	30	
R_s	series resistance	f = 100 MHz; note 1	–	2	Ω
ΔC/C	capacitance matching	V_R = 0.5 to 28 V; in a sequence of 4 diodes (gliding)	–	1	%
		V_R = 0.5 to 28 V; in a sequence of 15 diodes (gliding)	–	2	%

Note

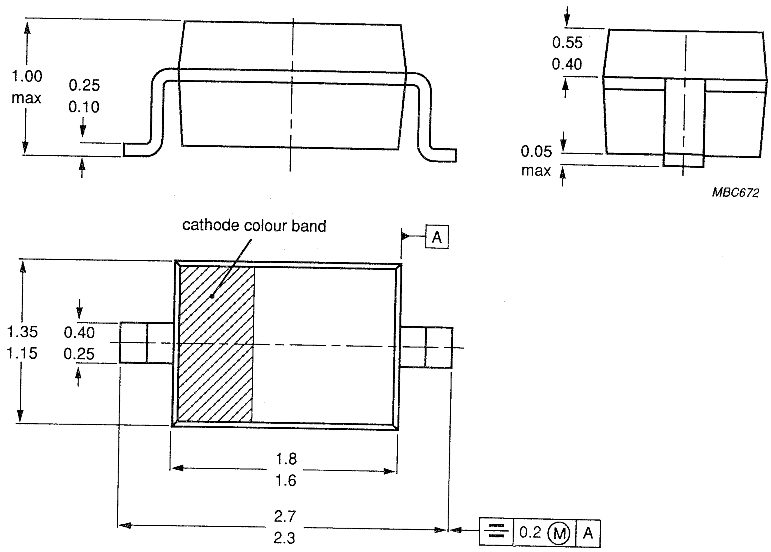
1. V_R is the value at which C_d = 30 pF.



f = 1 MHz; T_{amb} = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a red bar.

Fig.3 SOD323.

DESCRIPTION

The BB133 is a silicon, double-implanted variable capacitance diode in planar technology, intended for use in VHF tuners with a CATV range up to 460 MHz. It has a high linearity and is encapsulated in the ultra-small plastic SMD package, SOD323. A feature of this diode is the excellent matching performance, achieved by the Direct Matching Assembly procedure.

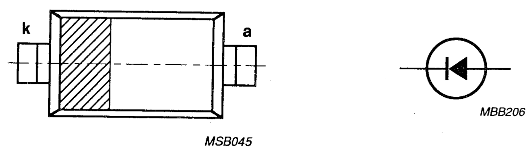
The diodes are delivered on tape in several matched groups, and are also available unmatched upon request.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_R	reverse current	V_R = 30 V	–	10	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	38	46	pF
		V_R = 28 V; f = 1 MHz	2.2	2.6	pF
$C_{0.5\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	14	21	
R_s	series resistance	f = 100 MHz; note 1	–	0.9	Ω

Note

1. V_R is the value at which C_d = 30 pF.



Marking code: BB133 = P3.

Fig.1 Simplified outline (SOD323) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	150	°C
T_{amb}	ambient operating temperature range		–55	125	°C

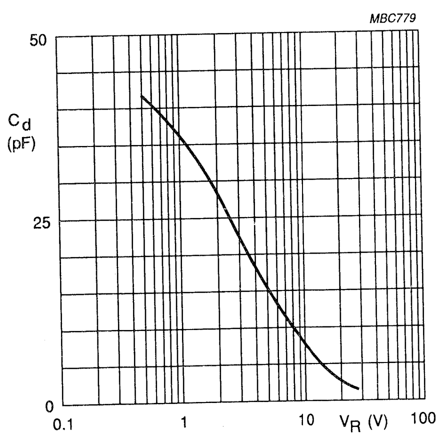
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 30 V	–	10	nA
		V_R = 30 V; T_{amb} = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	38	46	pF
		V_R = 28 V; f = 1 MHz	2.2	2.6	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	14	21	
R_s	series resistance	f = 100 MHz; note 1	–	0.9	Ω
ΔC/C	capacitance matching	V_R = 0.5 to 28 V; in a sequence of 4 diodes (gliding)	–	0.7	%
		V_R = 0.5 to 28 V; in a sequence of 15 diodes (gliding)	–	2	%

Note

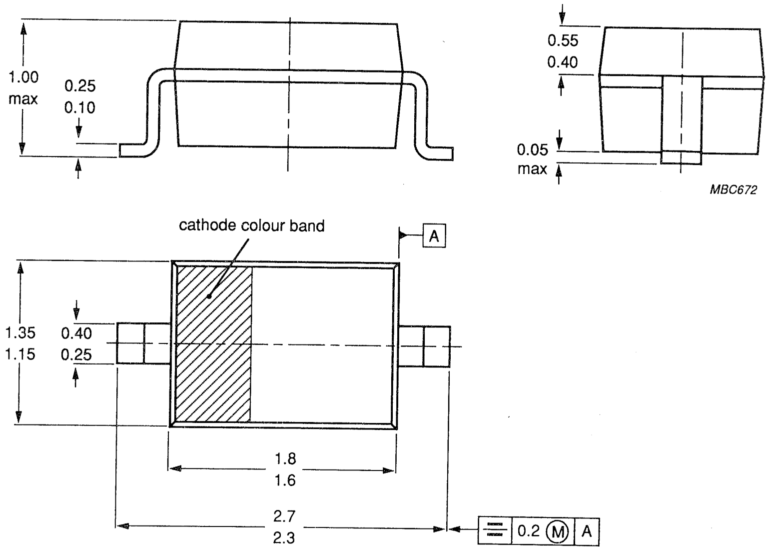
1. V_R is the value at which C_d = 30 pF.



f = 1 MHz; T_{amb} = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a yellow bar.

Fig.3 SOD323.

DESCRIPTION

The BB134 is a silicon, double-implanted variable capacitance diode in planar technology, intended for use in UHF tuners. It has a high linearity and is encapsulated in the ultra-small plastic SMD package, SOD323. A feature of this diode is the excellent matching performance, achieved by the Direct Matching Assembly procedure.

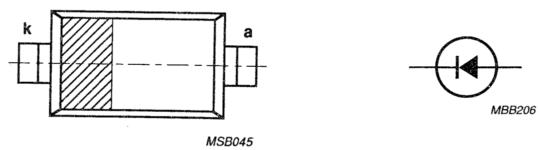
The diodes are delivered on tape in several matched groups. The unmatched type, BB135, has the same specification.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_R	reverse current	$V_R = 30$ V	–	10	nA
C_d	diode capacitance	$V_R = 0.5$ V; f = 1 MHz	17.5	21	pF
		$V_R = 28$ V; f = 1 MHz	1.7	2.1	pF
$C_{0.5\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	8.9	12	
R_s	series resistance	f = 470 MHz; note 1	–	0.75	Ω

Note

1. V_R is the value at which $C_d = 9$ pF.



Marking code: BB134 = P4.

Fig.1 Simplified outline (SOD323) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	150	°C
T_{amb}	ambient operating temperature range		–55	125	°C

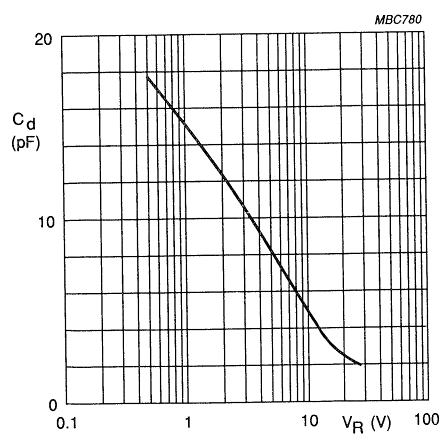
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 30 V	–	10	nA
		V_R = 30 V; T_{amb} = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	17.5	21	pF
		V_R = 28 V; f = 1 MHz	1.7	2.1	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	8.9	12	
R_s	series resistance	f = 470 MHz; note 1	–	0.75	Ω
ΔC/C	capacitance matching	V_R = 0.5 to 28 V; in a sequence of 4 diodes (gliding)	–	0.5	%
		V_R = 0.5 to 28 V; in a sequence of 15 diodes (gliding)	–	2	%

Note

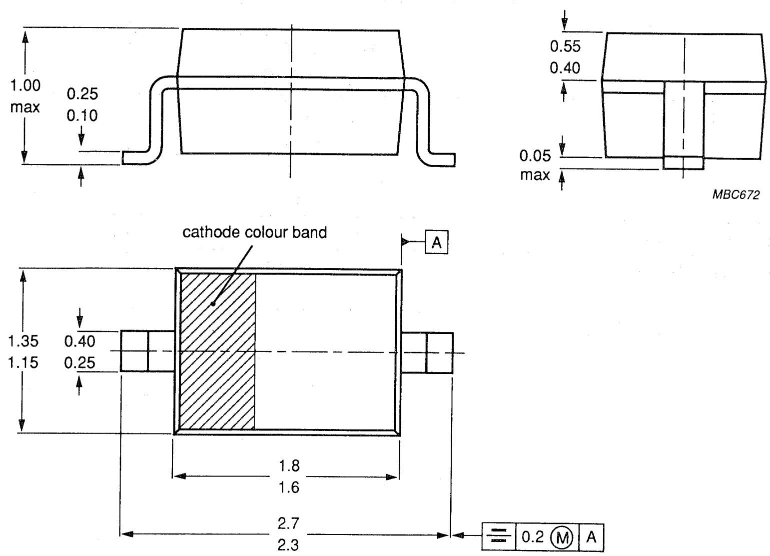
1. V_R is the value at which C_d = 9 pF.



f = 1 MHz; T_{amb} = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a white bar.

Fig.3 SOD323.

UHF variable capacitance diode BB135

DESCRIPTION

The BB135 is a silicon, double-implanted variable capacitance diode in planar technology, intended for use in UHF tuners. It has a high linearity and is encapsulated in the ultra-small plastic SMD package, SOD323.

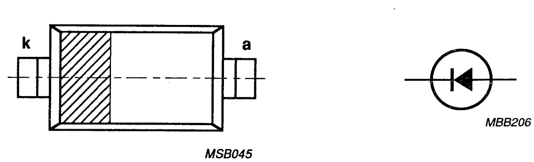
The diodes are delivered on tape (3000 or 10 000 pieces), without gaps.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
I_R	reverse current	V_R = 30 V	–	10	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	17.5	21	pF
		V_R = 28 V; f = 1 MHz	1.7	2.1	pF
$C_{0.5\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	8.9	12	
R_s	series resistance	f = 470 MHz; note 1	–	0.75	Ω

Note

1. V_R is the value at which C_d = 9 pF.



Marking code: BB135 = P5.

Fig.1 Simplified outline (SOD323) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	30	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	150	°C
T_{amb}	ambient operating temperature range		–55	125	°C

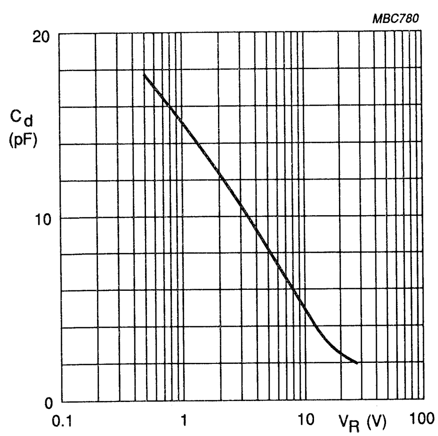
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 30 V	–	10	nA
		V_R = 30 V; T_{amb} = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 0.5 V; f = 1 MHz	17.5	21	pF
		V_R = 28 V; f = 1 MHz	1.7	2.1	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	8.9	12	
R_s	series resistance	f = 470 MHz; note 1	–	0.75	Ω

Note

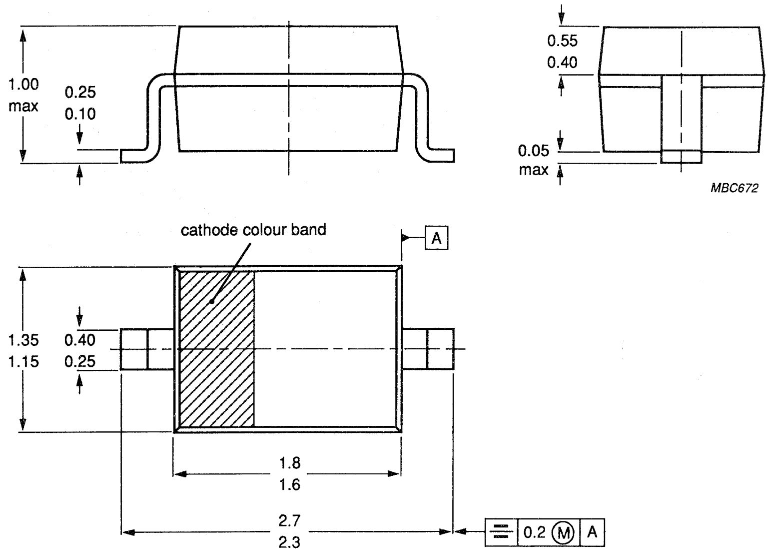
1. V_R is the value at which C_d = 9 pF.



f = 1 MHz; T_{amb} = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a white bar.

Fig.3 SOD323.

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

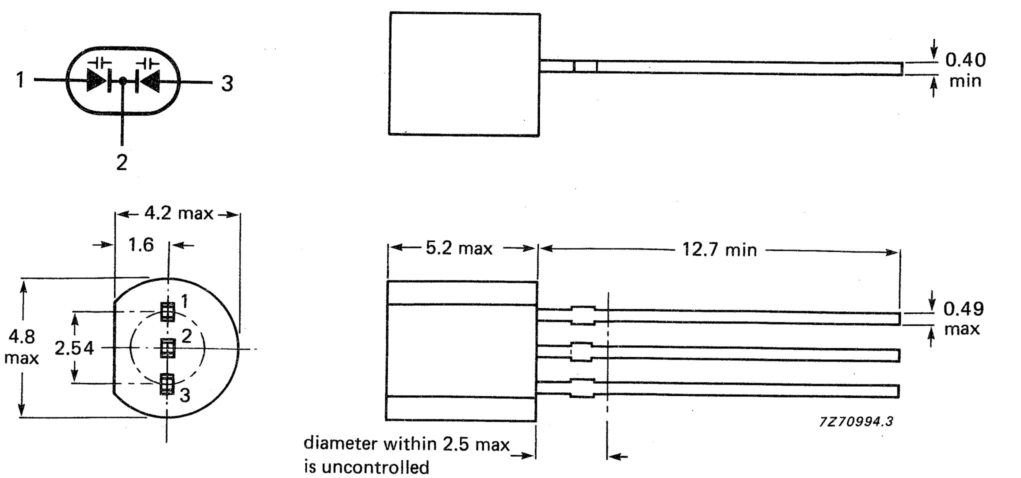
For each diode:

Continuous reverse voltage	V_R	max.		30	V
Junction temperature	T_j	max.		100	°C
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
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:

$T_j = 25$ °C

			BB204G	BB204B	
Reverse current at $V_R = 30$ V	I_R	<	50		nA
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
$V_R = 30$ V	C_d	typ.	14		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

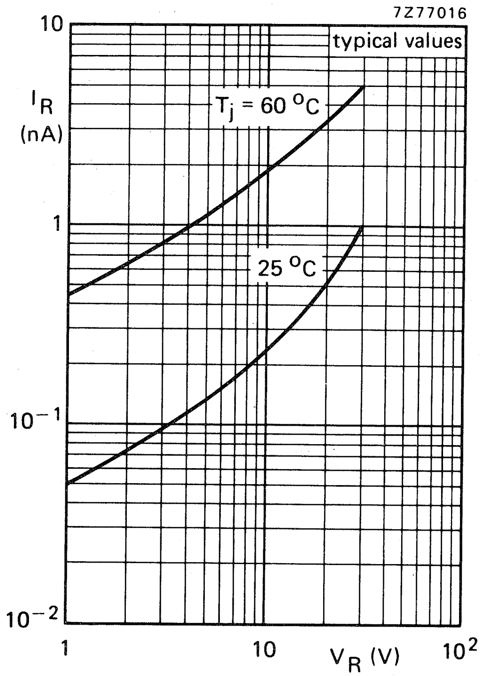

7Z77016
typical values
I_R (nA)
T_j = 60 °C
25 °C
10
1
10^{-1}
10^{-2}
1
10
V_R (V)
10^2

Fig. 2.

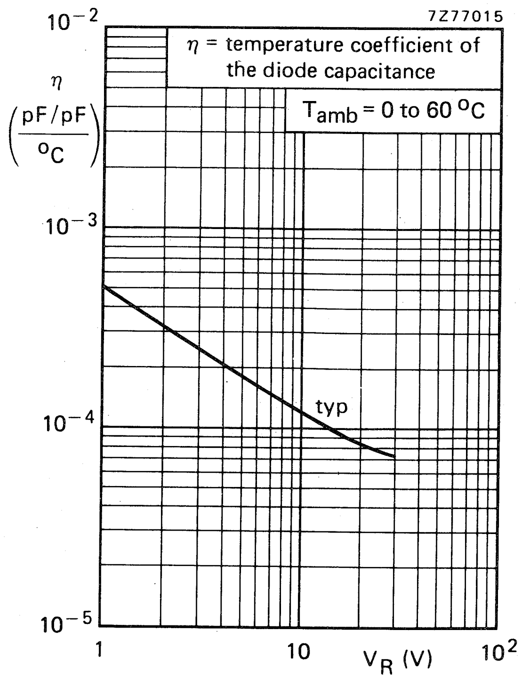

7Z77015
η = temperature coefficient of the diode capacitance
T_{amb} = 0 to 60 °C
η (pF/pF / °C)
typ
10^{-2}
10^{-3}
10^{-4}
10^{-5}
1
10
V_R (V)
10^2

Fig. 3.

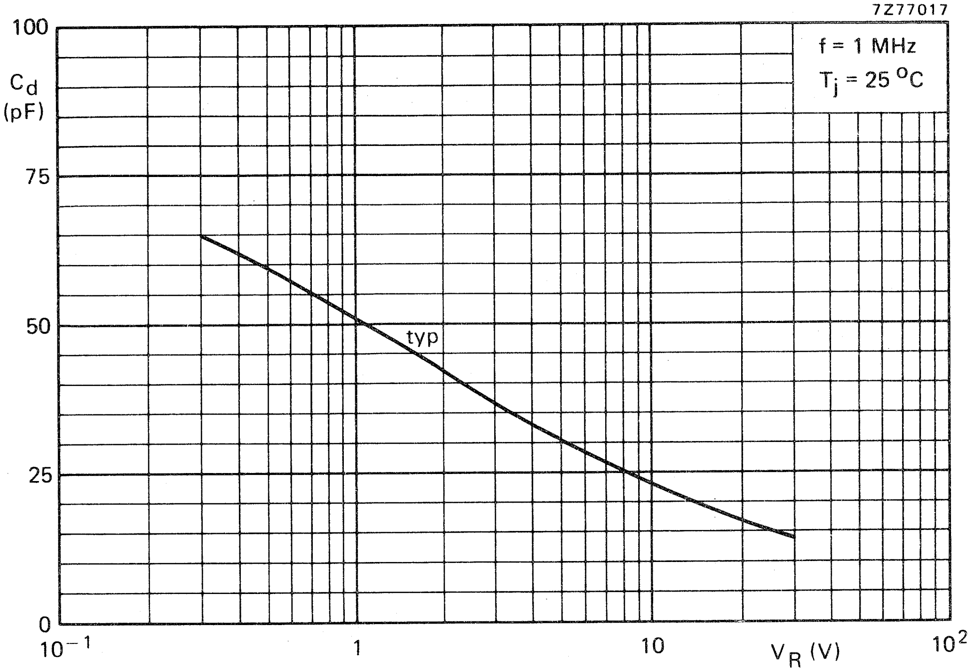

7Z77017
100
75
50
25
0
C_d
(pF)
f = 1 MHz
T_j = 25 °C
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 4.

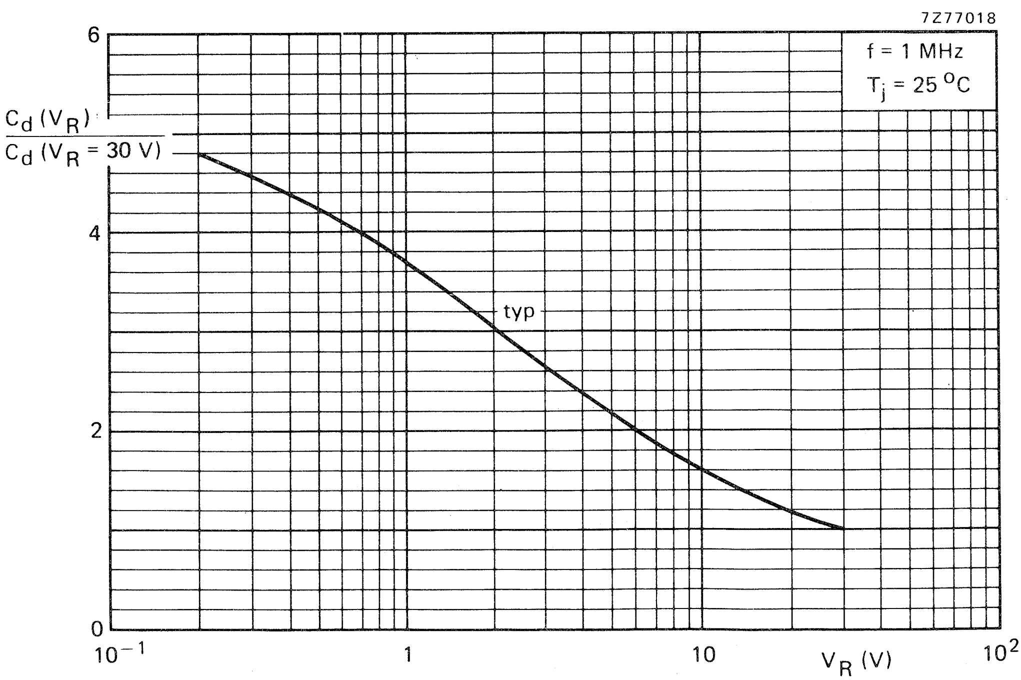

7Z77018
6
4
2
0
$\frac{C_d (V_R)}{C_d (V_R = 30\ V)}$
f = 1 MHz
T_j = 25 °C
typ
10^{-1}
1
10
V_R (V)
10^2

Fig. 5.

A.M. VARIABLE CAPACITANCE DOUBLE DIODES

The BB212 is a double 9V variable capacitance 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

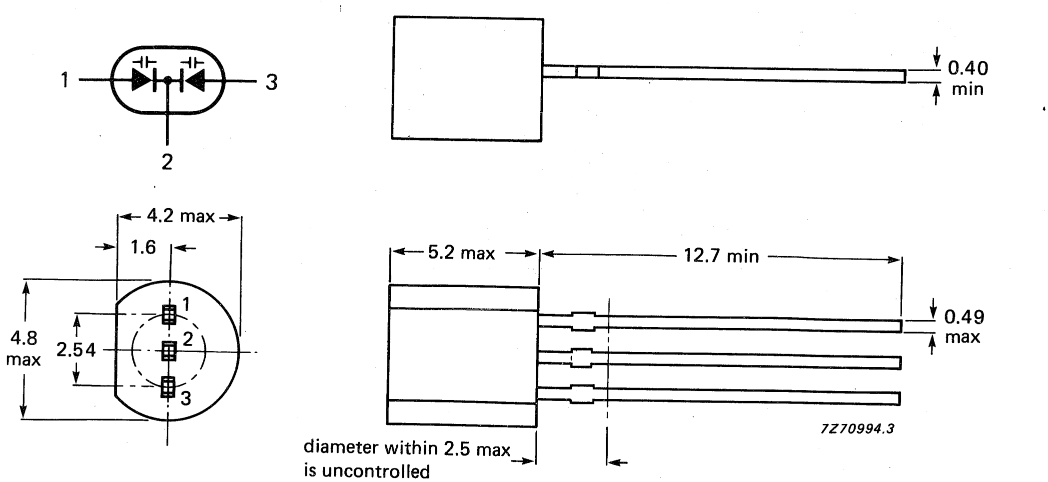
For each diode:

Continuous reverse voltage	V_R	max.	12	V
Operating junction temperature	T_j	max.	85	°C
Reverse current at T_j = 25 °C 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 $a_2 > a_1$

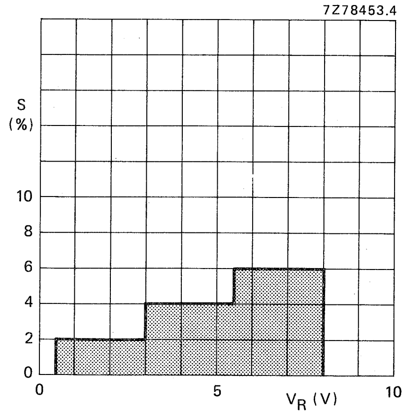


Fig. 2 The shaded area represents the maximum tolerance of the two diodes in one envelope as a function of the reverse voltage.

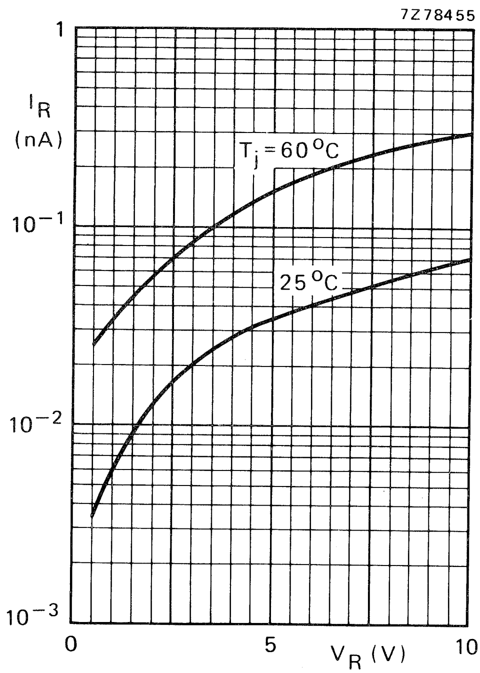


Fig. 3 Typical values.

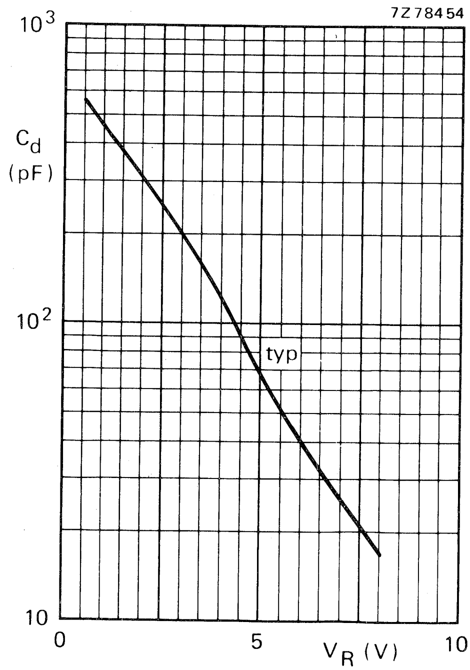


Fig. 4 f = 1 MHz.

UHF VARIABLE CAPACITANCE DIODE

The BB215 is a silicon variable capacitance diode in a hermetically sealed glass envelope (SOD-80) and intended for application in UHF tuners. The leadless SOD-80 encapsulation is intended for surface mounting.
The diode features a capacitance characteristic with a good linearity.

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.

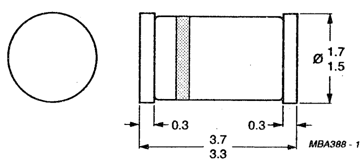
QUICK REFERENCE DATA

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-80.



The cathode is indicated by a white band on the body and a second green band indicates the BB215 type.

RATINGS

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

Continuous reverse voltage	V_R	max.	30 V
Forward current (DC)	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	<	200 nA
Diode capacitance at f = 500 kHz			
V_R = 1 V	C_d	typ.	17 pF
		<	18 pF
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
		typ.	8,3
Series resistance at f = 470 MHz and at that value of V_R at which C_d = 9 pF	r_s	typ.	0,63 Ω

UHF VARIABLE CAPACITANCE DIODE

The BB405B is a silicon variable capacitance diode in a hermetically sealed glass envelope and intended for application in UHF 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.

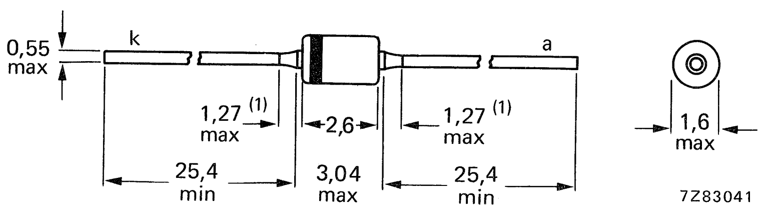
QUICK REFERENCE DATA

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 (DC)	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 = 28 V	C_d		1,8 to 2,2 pF
Capacitance ratio at f = 500 kHz	$\frac{C_d(V_R = 1\text{ V})}{C_d(V_R = 28\text{ V})}$	>	7,6
Relative capacitance difference	$\frac{\Delta C}{C}$	⩽	3 %
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).

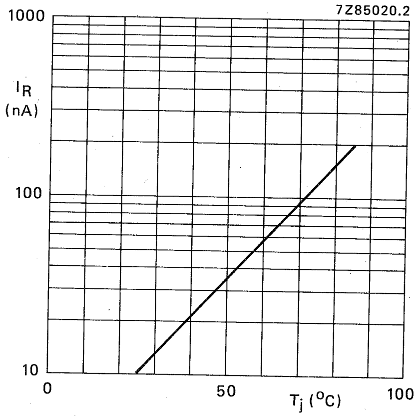


Fig. 2 Maximum values reverse current versus junction temperature; V_R = 28 V.

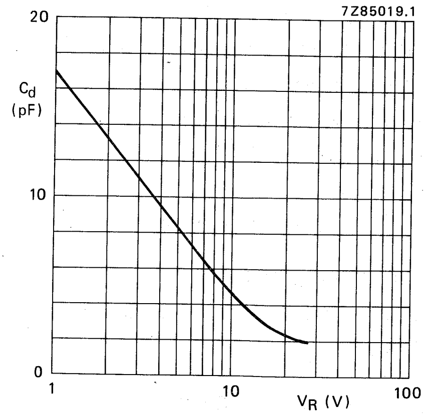


Fig. 3 Maximum values diode capacitance at f = 500 kHz.

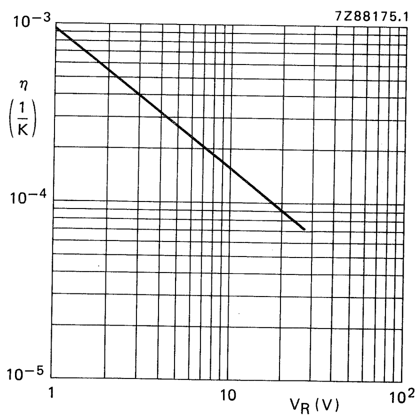


Fig. 4 Maximum values temperature coefficient versus reverse voltage; T_j = 0 to 85 °C.

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.

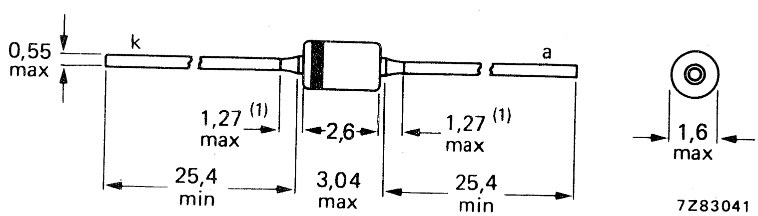
QUICK REFERENCE DATA

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

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

Dimensions in mm



(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/mW

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

UHF VARIABLE CAPACITANCE DIODE

The BB515 is a silicon variable capacitance diode in a hermetically sealed glass envelope and intended intended for application in UHF tuners

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30 V
Reverse current at V_R = 30 V	I_R	max.	10 nA
Diode capacitance at f = 1 MHz at V_R = 28 V	C_d		1.85 to 2.25 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		8 to 9.6
Series resistance at f = 470 MHz V_R is that value at which C_d = 9 pF	r_s	typ.	0.5 Ω

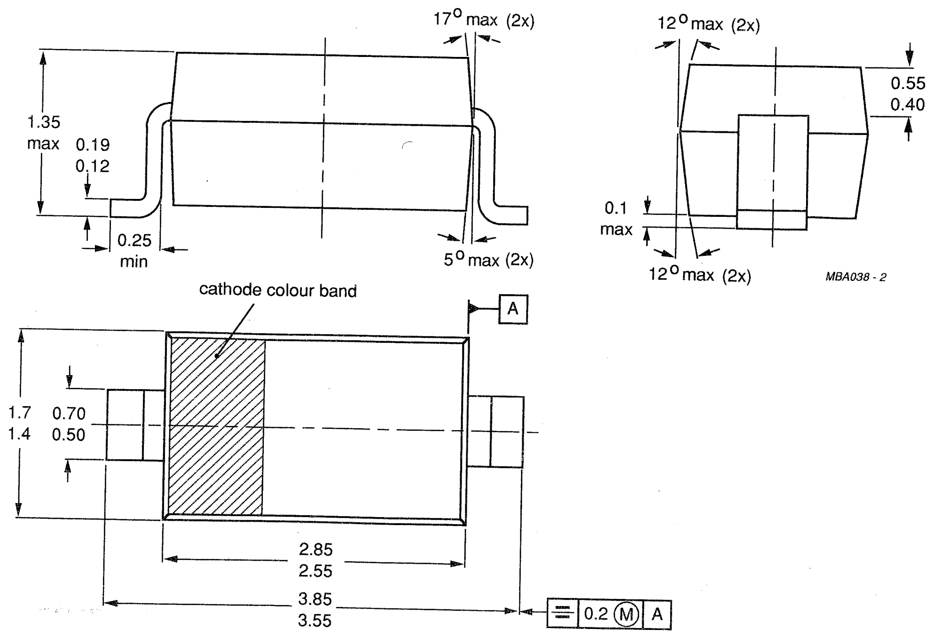
MECHANICAL DATA

Fig.1 SOD123.

Dimensions in mm

Marking code

BB515 = P



Cathode indicated by a white band.

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 (DC)	I_F	max.	20 mA
Storage temperature range	T_{stg}		−55 to + 150 °C
Operating ambient temperature range	T_{amb}		−55 to + 125 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 30 V	I_R	max.	10 nA
V_R = 30 V; T_{amb} = 85 °C	I_R	max.	200 nA
Reverse breakdown voltage			
I_R = 10 μA	$V_{(BR)R}$	min.	30 V
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		16 to 19.5 pF
V_R = 28 V	C_d		1.85 to 2.25 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		8 to 9.6
Tolerance of capacitance difference between two diodes of V_R = 0.5 V to 28 V	$\frac{\Delta C}{C}$	max.	3 %
Series resistance at f = 470 MHz and at that value of V_R at which C_d = 9 pF	r_s	typ.	0.5 Ω
Series inductance	L_s	typ.	2.8 nH

VHF VARIABLE CAPACITANCE DIODE

The BB619 is a VHF variable capacitance diode in planar technology with a very high capacitance ratio intended for VHF-band B up to 460 MHz in all-band tuners.
The diode is encapsulated in a hermetically sealed SOD123 plastic envelope suitable for surface mounting.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30 V
Reverse current at V_R = 30 V	I_R	max.	10 nA
Diode capacitance at f = 1 MHz at V_R = 28 V	C_d		2.4 to 2.9 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	min.	12.5
		typ.	14
Series resistance at f = 100 MHz V_R is that value at which C_d = 30 pF	r_s	typ.	0.7 Ω

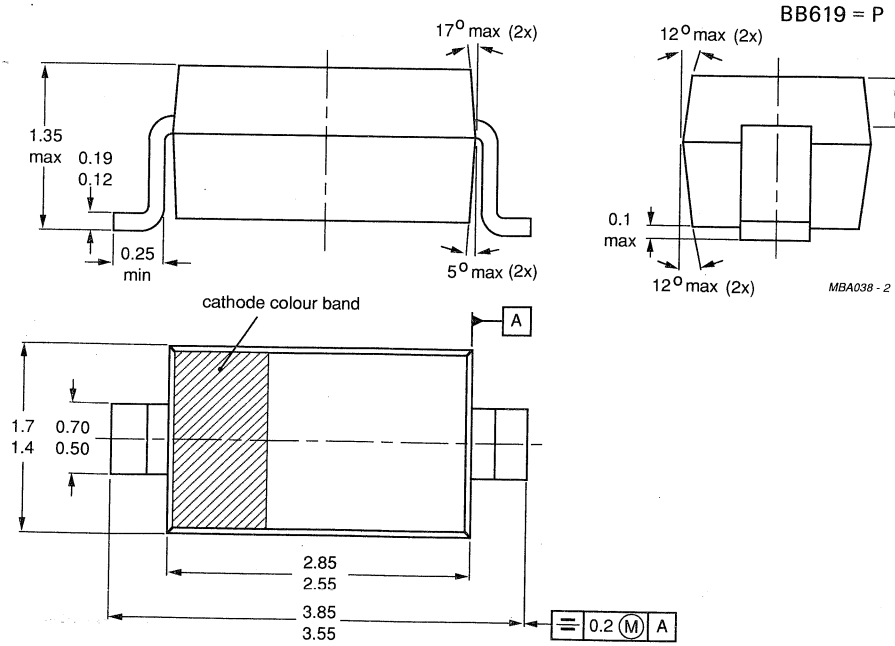
MECHANICAL DATA

Fig.1 SOD123.

Dimensions in mm

Marking code

BB619 = P



Cathode indicated by a yellow band.

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 (DC)	I_F	max.	20 mA
Storage temperature range	T_{stg}		−55 to + 150 °C
Operating ambient temperature range	T_{amb}		−55 to + 125 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 30 V	I_R	max.	10 nA
V_R = 30 V; T_{amb} = 85 °C	I_R	max.	200 nA
Reverse breakdown voltage			
I_R = 10 μA	$V_{(BR)R}$	min.	30 V
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		33.5 to 41 pF
V_R = 28 V	C_d		2.4 to 2.9 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	min. typ.	12.5 14
Tolerance of capacitance difference between two diodes of V_R = 1.0 V to 28 V	$\frac{\Delta C}{C}$	max.	2.5 %
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 30 pF	r_s	typ.	0.7 Ω
Series inductance	L_s	typ.	2.8 nH

VHF VARIABLE CAPACITANCE DIODE

The BB620 is a VHF variable capacitance diode in planar technology with a very high capacitance ratio intended for VHF-band A up to 160 MHz in all-band tuners.
The diode is encapsulated in a hermetically sealed SOD123 envelope suitable for surface mounting.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30 V
Reverse current at V_R = 30 V	I_R	max.	10 nA
Diode capacitance at f = 1 MHz at V_R = 28 V	C_d		2.9 to 3.4 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d (V_R = 1\ V)}{C_d (V_R = 28\ V)}$		19.5 to 25
Series resistance at f = 100 MHz V_R is that value at which C_d = 30 pF	r_s	typ.	1.3 Ω

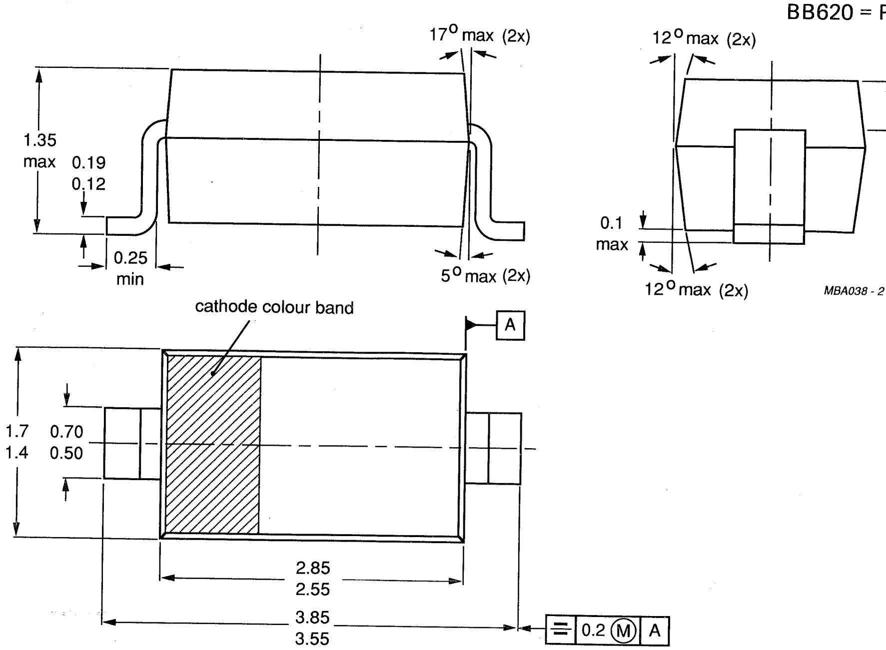
MECHANICAL DATA

Dimensions in mm

Fig.1 SOD123.

Marking code

BB620 = P



Cathode indicated by a red band.

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 (DC)	I_F	max.	20 mA
Storage temperature range	T_{stg}		−55 to + 150 °C
Operating ambient temperature range	T_{amb}		−55 to + 125 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 30 V	I_R	max.	10 nA
V_R = 30 V; T_{amb} = 85 °C	I_R	max.	200 nA
Reverse breakdown voltage			
I_R = 10 μA	$V_{(BR)R}$	min.	30 V
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		62 to 76 pF
V_R = 28 V	C_d		2.9 to 3.4 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		19.5 to 25
Tolerance of the capacitance difference between two diodes of V_R = 1.0 V to 28 V	$\frac{\Delta C}{C}$	max.	2.5 %
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 30 pF	r_s	typ.	1.3 Ω
Series inductance	L_s	typ.	2.8 nH

VHF VARIABLE CAPACITANCE DOUBLE DIODE

The BB804 is a variable capacitance double diode in planar technology with common cathode in a plastic SOT23 envelope. It is intended for FM tuning especially for car radios.

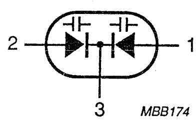
QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	18 V
Repetitive peak reverse voltage	V_{RRM}	max.	20 V
Forward current (DC)	I_F	max.	50 mA
Operating junction temperature	T_j	max.	100 °C
Reverse current	I_R	max.	20 nA
Diode capacitance at f = 1 MHz V_R = 2 V	C_d		42 to 47.5 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 2\ V)}{C_d\ (V_R = 8\ V)}$		1.65 to 1.75
Series resistance at f = 100 MHz V_R is that value at which C_d = 38 pF	r_s	typ.	0.20 Ω

MECHANICAL DATA

Dimensions in mm

Marking SF x (x = 0 - 4)



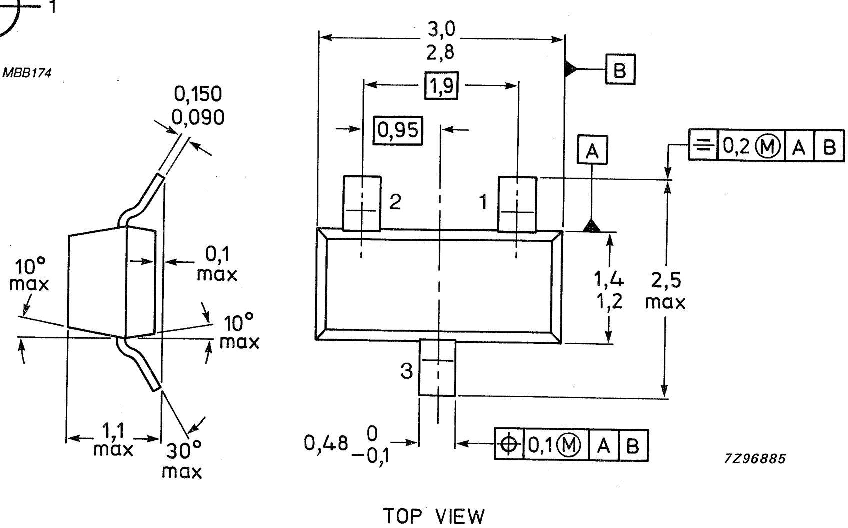


Fig.1 SOT23.

RATINGS

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

Continuous reverse voltage	V_R	max.	18 V
Forward current (DC)	I_F	max.	50 mA
Repetitive peak reverse voltage	V_{RRM}	max.	20 V
Storage temperature range	T_{stg}	−55 to + 100	°C
Operating junction temperature	T_j	max.	100 °C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm	$R_{th\,j\text{-}a}$	=	430 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Reverse current			
V_R = 16 V	I_R	<	20 nA
V_R = 16 V; T_{amb} = 60 °C	I_R	<	200 nA
Diode capacitance at f = 1.0 MHz			
V_R = 2 V			
red 0	C_d		42 to 43.5 pF
yellow 1	C_d		43 to 44.5 pF
white 2	C_d		44 to 45.5 pF
green 3	C_d		45 to 46.5 pF
blue 4	C_d		46 to 47.5 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 2\ V)}{C_d\ (V_R = 8\ V)}$		1.65 to 1.75
Series resistance at f = 100 MHz, V_R is that value at which C_d = 38 pF	r_s	typ.	0.20 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.

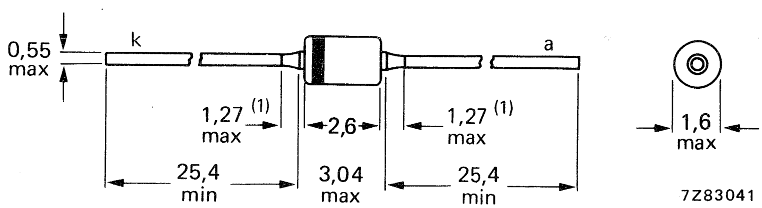
QUICK REFERENCE DATA

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	%

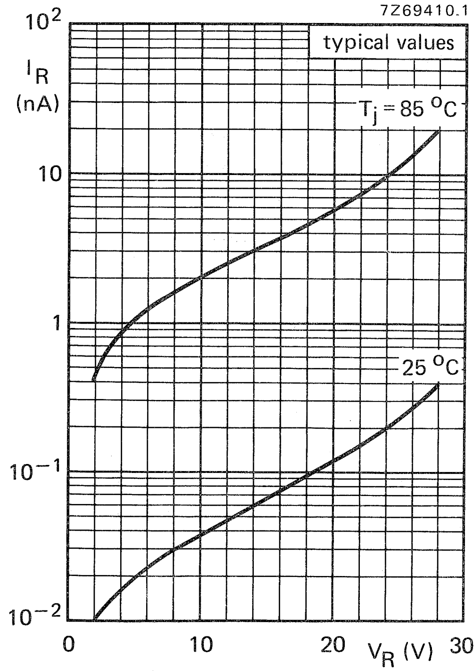


Fig. 2 Typical values.

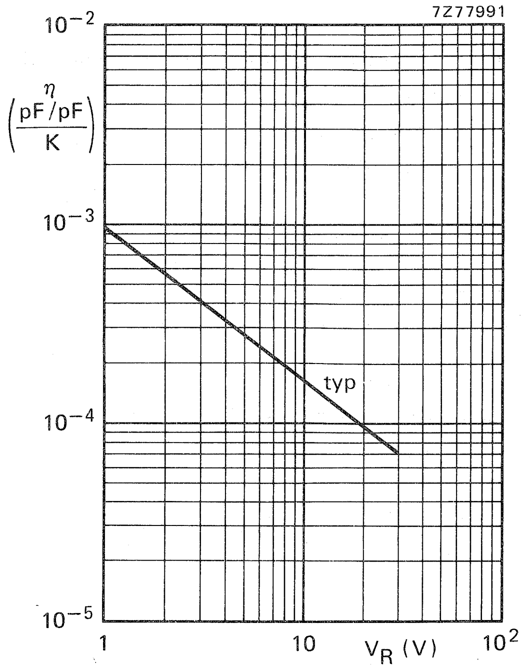


Fig. 3 Temperature coefficient of the diode capacitance; T_{amb} = 0 to 85 ^oC.

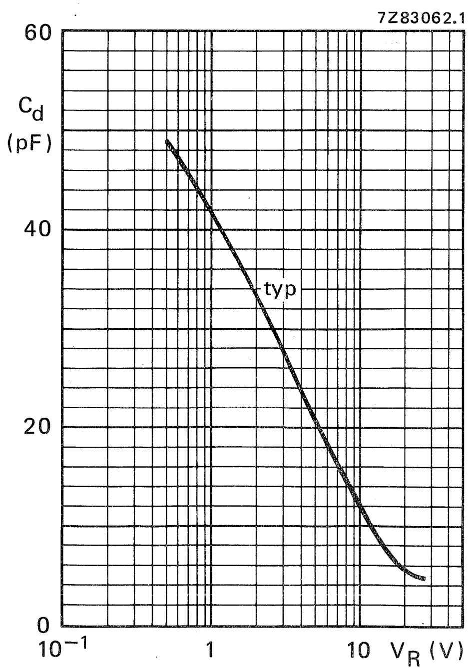


Fig. 4 f = 500 kHz; T_{amb} = 25 ^oC.

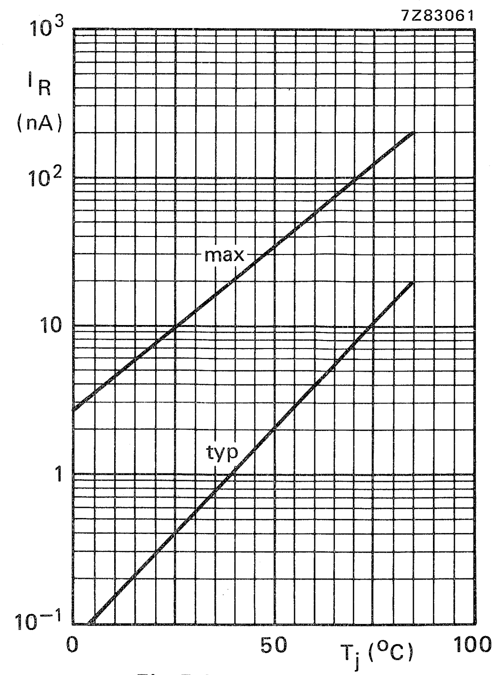


Fig. 5 V_R = 28 V.

UHF VARIABLE CAPACITANCE DIODE

The BB811 is a silicon variable capacitance diode in a hermetically sealed SOD123 envelope and intended for application in TV-SAT tuners up to 2 GHz

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	30 V
Reverse current at V_R = 30 V	I_R	max.	20 nA
Diode capacitance at f = 1 MHz at V_R = 28 V	C_d		0.85 to 1.2 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		7.8 to 9.5
Series resistance at f = 100 MHz V_R is that value at which C_d = 9 pF	r_s	max.	1.45 Ω

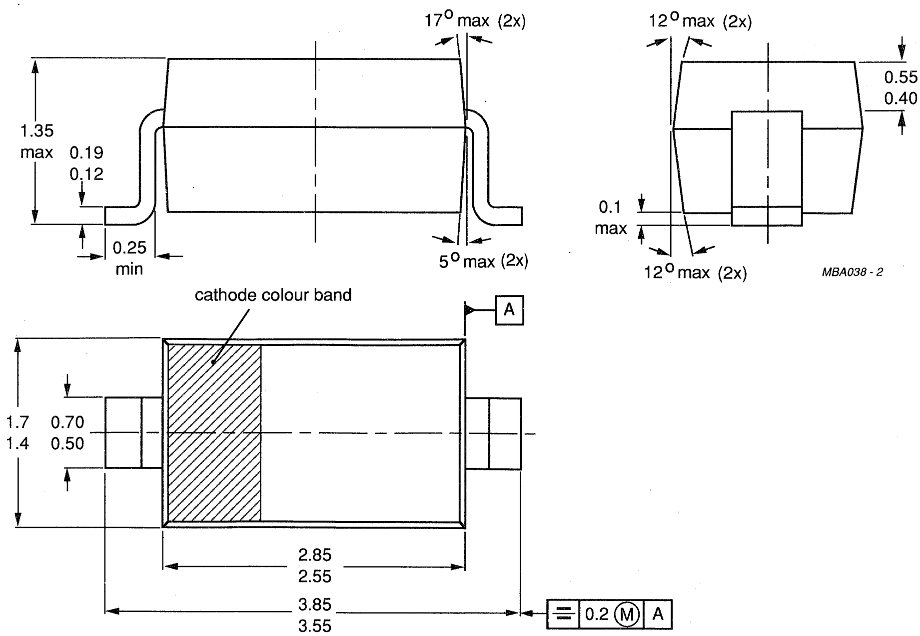
MECHANICAL DATA

Fig.1 SOD123.

Dimensions in mm

Marking code

BB811 = T



Cathode indicated by a white band.

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 (DC)	I_F	max.	20 mA
Storage temperature range	T_{stg}		−55 to + 150 °C
Operating ambient temperature range	T_{amb}		−55 to + 125 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reverse current			
V_R = 30 V	I_R	max.	20 nA
V_R = 30 V; T_{amb} = 85 °C	I_R	max.	500 nA
Reverse breakdown voltage			
I_R = 10 μA	$V_{(BR)R}$	min.	30 V
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d		7.8 to 9.8 pF
V_R = 28 V	C_d		0.85 to 1.2 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$		7.8 to 9.5
Tolerance of capacitance difference between two diodes of V_R = 0.5 V to 28 V	$\frac{\Delta C}{C}$	max.	3 %
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 9 pF	r_s	max.	1.45 Ω
Series inductance	L_s	typ.	2.8 nH

Variable capacitance diode | BB901

DESCRIPTION

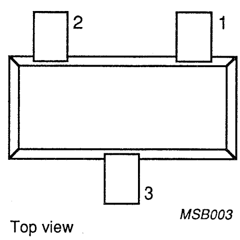
The BB901 is a silicon planar variable capacitance diode in a microminiature SOT23 envelope. It is intended as a tunable coupling diode in VHF all-band tuners.

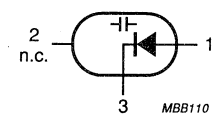
QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	reverse voltage		–	28	V
I_R	reverse current	V_R = 28 V	–	10	nA
C_d	diode capacitance	V_R = 28 V; f = 1 MHz	–	1.055	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	12	–	
R_s	series resistance	f = 100 MHz; note 1	–	3	Ω

Note

1. V_R is the value at which C_d = 10 pF.





Marking code: BB901 = S14.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	28	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		−65	100	°C
T_j	junction operating temperature		–	85	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient (note 1)	430 K/W

Note

1. Device mounted on a ceramic substrate, 8 x 10 x 0.7 mm.

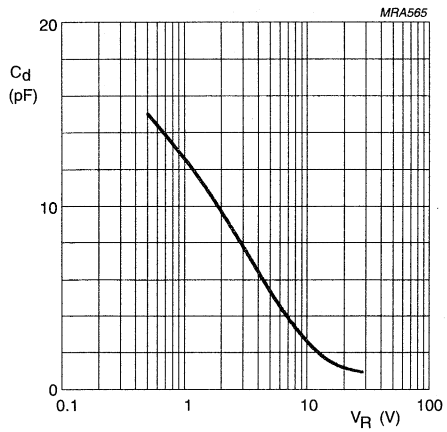
CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 28 V	–	10	nA
		V_R = 28 V; T_j = 85 °C	–	200	nA
C_d	diode capacitance	V_R = 28 V; f = 1 MHz	–	1.055	pF
$C_{0.5\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	12	–	
R_s	series resistance	f = 100 MHz; note 1	–	3	Ω

Note

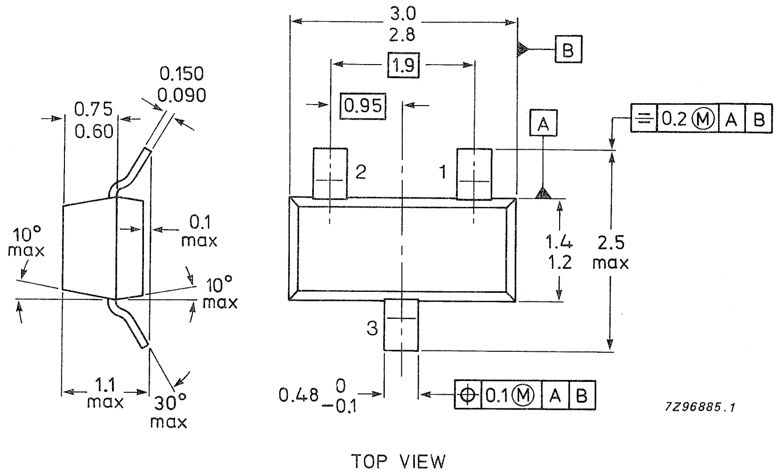
1. V_R is the value at which C_d = 10 pF.



f = 1 MHz; T_j = 25 °C.

Fig.2 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.3 SOT23.

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.

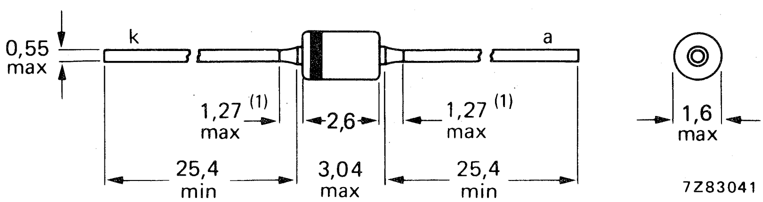
QUICK REFERENCE DATA

Reverse voltage (peak value)	V_{RM}	max.	32	V
Reverse current at V_R = 28 V	I_R	<	10	nA
Diode capacitance at f = 0,5 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 = 0,5 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 0,9	Ω 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 = 0,5 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
Tolerance of the capacitance difference between two diodes at V_R = 1 to 28 V	$\frac{\Delta C}{C}$	<		2,5 %

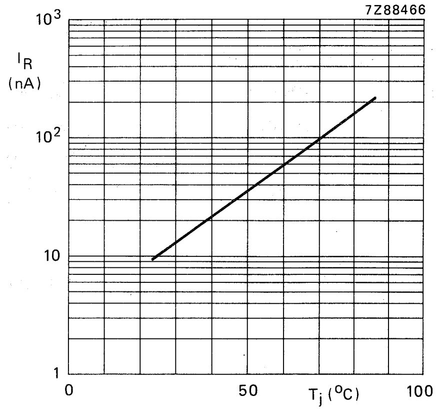


Fig. 2 Reverse current as a function of junction temperature at V_R = 28 V.

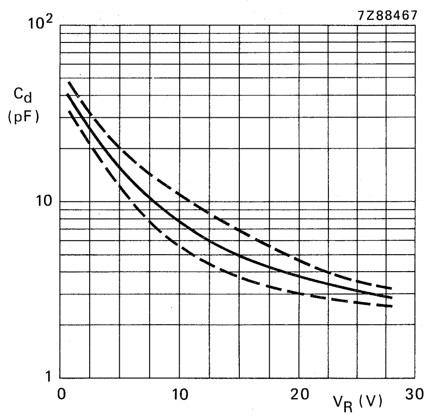


Fig. 3 Diode capacitance as a function of reverse voltage.

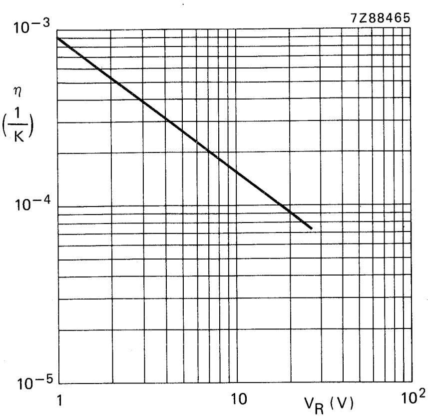


Fig. 4 Temperature coefficient of the diode capacitance as a function of reverse voltage at T_j = 0 to 85 °C.

VHF VARIABLE CAPACITANCE DIODE

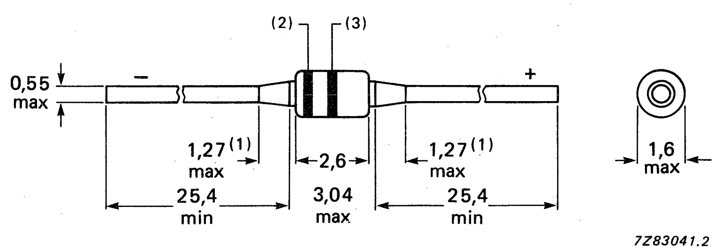
The BB910 is a VHF variable capacitance diode in planar technology with a very high capacitance ratio intended for VHF-band B up to 460 MHz in all-band tuners.
The diode is encapsulated in the whiskerless glass envelope SOD-68.

QUICK REFERENCE DATA

Reverse voltage, peak value	V_{RM}	max.	32 V
Reverse current V_R = 28 V	I_R	<	10 nA
Diode capacitance at f = 1 MHz V_R = 0.5 V	C_d	>	38 pF
V_R = 28 V	C_d		2.3 to 2.7 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0.5\ V)}{C_d\ (V_R = 28\ V)}$	>	14
Series resistance at f = 100 MHz V_R is that value at which C_d = 40 pF	r_s	<	1.0 Ω

MECHANICAL DATA

Dimensions in mm



(1) Lead diameter in this zone uncontrolled
(2) Cathode type taping (on black body)
(3) Additional ring for type taping.

Fig. 1 SOD-68.

RATINGS

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

Reverse voltage, peak value	V_{RM}	max.	32 V
Forward current (DC)	I_F	max.	20 mA
Storage temperature range	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/W

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 = 1 MHz			
V_R = 0.5 V	C_d	>	38 pF
V_R = 28 V	C_d		2.3 to 2.7 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0.5\ V)}{C_d\ (V_R = 28\ V)}$	>	14
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 40 pF	r_s	<	1.0 Ω
Tolerance of capacitance difference between two diodes at V_R = 0.5 to 28 V	$\frac{\Delta C}{C}$	<	2.5 %

VHF VARIABLE CAPACITANCE DIODE

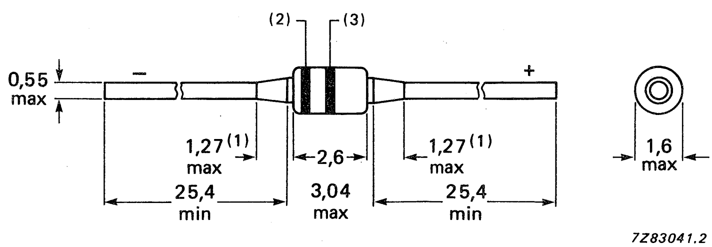
The BB911 is a VHF variable capacitance diode in planar technology with a very high capacitance ratio intended for VHF-band A up to 160 MHz in all-band tuners.
The diode is encapsulated in the whiskerless glass envelope SOD-68.

QUICK REFERENCE DATA

Reverse voltage, peak value	V_{RM}	max.	32	V
Reverse current V_R = 28 V	I_R	<	10	nA
Diode capacitance at f = 1 MHz V_R = 0.5 V	C_d	>	63	pF
V_R = 28 V	C_d		2.5 to 3.0	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0.5\ V)}{C_d\ (V_R = 28\ V)}$	>	21	
Series resistance at f = 100 MHz V_R is that value at which C_d = 40 pF	r_s	<	2.0	Ω

MECHANICAL DATA

Dimensions in mm



(1) Lead diameter in this zone uncontrolled
(2) Cathode type taping (on black body)
(3) Additional ring for type taping.

Fig. 1 SOD-68.

RATINGS

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

Reverse voltage, peak value	V_{RM}	max.	32 V
Forward current (DC)	I_F	max.	20 mA
Storage temperature range	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/W

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 = 1 MHz			
V_R = 0.5 V	C_d	>	63 pF
V_R = 28 V	C_d		2.5 to 3.0 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 0.5\ V)}{C_d\ (V_R = 28\ V)}$	>	21
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 40 pF	r_s	<	2.0 Ω
Tolerance of capacitance difference between two diodes at V_R = 1 to 28 V	$\frac{\Delta C}{C}$	<	2.5 %

Variable capacitance diode BBY31

DESCRIPTION

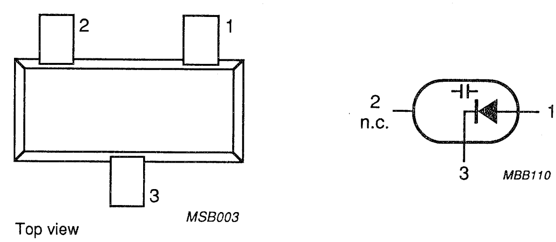
The BBY31 is a silicon planar variable capacitance diode in a microminiature SOT23 envelope. It is intended for electronic tuning applications in thick and thin film circuits.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_R	reverse voltage		–	–	28	V
I_R	reverse current	V_R = 28 V	–	–	10	nA
C_d	diode capacitance	V_R = 28 V; f = 1 MHz	1.6	–	2	pF
$C_{1\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	–	8.3	–	
R_s	series resistance	f = 470 MHz; note 1	–	–	1.2	Ω

Note

1. V_R is the value at which C_d = 9 pF.



Marking code: BBY31 = S1.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	28	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–65	100	°C
T_j	junction operating temperature		–	85	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient (note 1)	430 K/W

Note

1. Device mounted on a ceramic substrate, 7 x 5 x 0.5 mm.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_R	reverse current	V_R = 28 V	–	–	10	nA
		V_R = 28 V; T_j = 85 °C	–	–	1	µA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	–	15	–	pF
		V_R = 28 V; f = 1 MHz	1.6	–	2	pF
$C_{1\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	–	8.3	–	
R_s	series resistance	f = 470 MHz; note 1	–	–	1.2	Ω

Note

1. V_R is the value at which C_d = 9 pF.

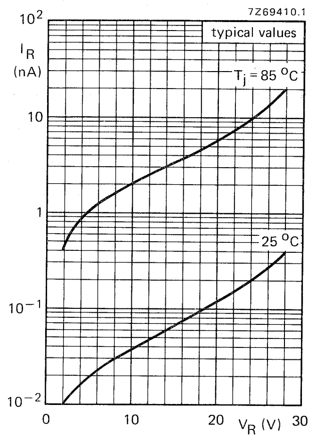


Fig.2 Reverse current as a function of reverse voltage, typical values.

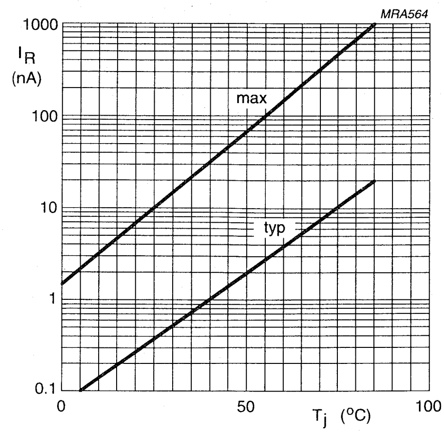


Fig.3 Reverse current as a function of junction temperature.

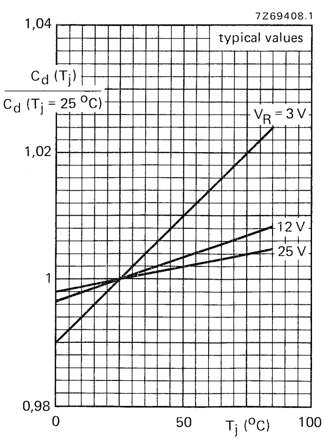


Fig.4 Diode capacitance as a function of junction temperature, typical values.

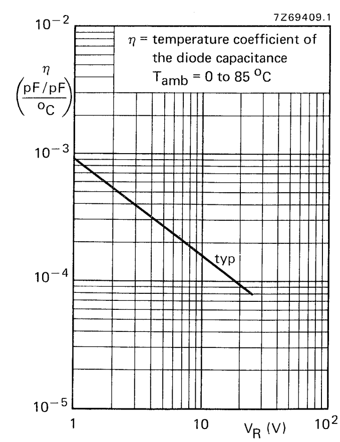
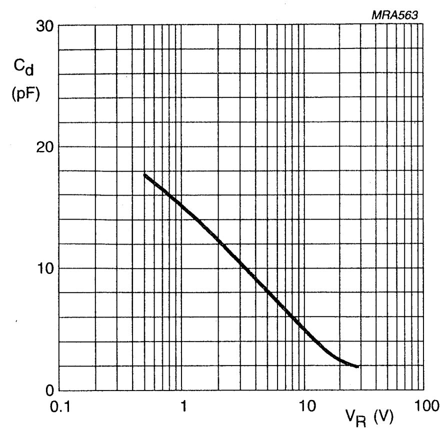


Fig.5 Temperature coefficient of diode capacitance.

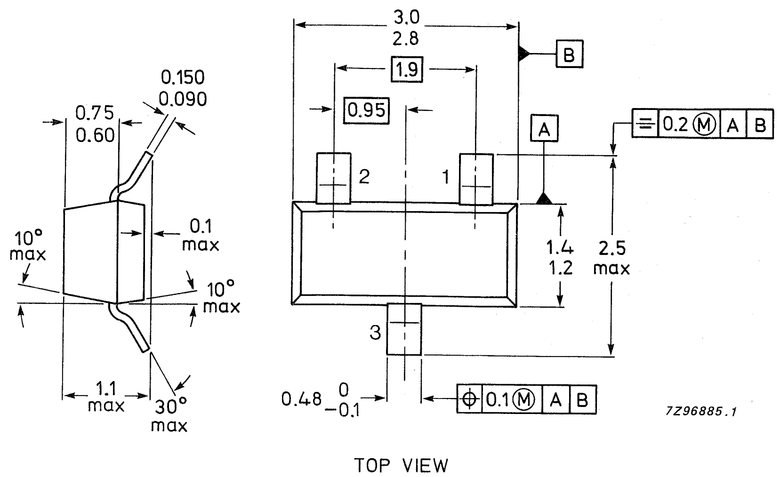
Variable capacitance diode BBY31



f = 1 MHz; T_j = 25 °C.

Fig.6 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.7 SOT23.

DOUBLE VARIABLE CAPACITANCE DIODE

The BBY39 is a double variable capacitance diode with a common cathode and mounted in a micro-miniature envelope (SOT-23), suitable for surface mounting. The two diodes in one envelope are matched.

The device is intended for application in electronic tuners in satellite TV systems.

QUICK REFERENCE DATA

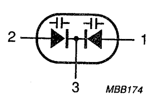
For each diode:			
Continuous reverse voltage	V_R	max.	30 V
Operating junction temperature	T_j	max.	85 °C
Reverse current V_R = 28 V	I_R	<	10 nA
Diode capacitance at f = 1 MHz V_R = 28 V	C_d		1,6 to 2,0 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	>	8,0
Series resistance at f = 470 MHz V_R is that value at which C_d = 9 pF	r_s	<	1,2 Ω

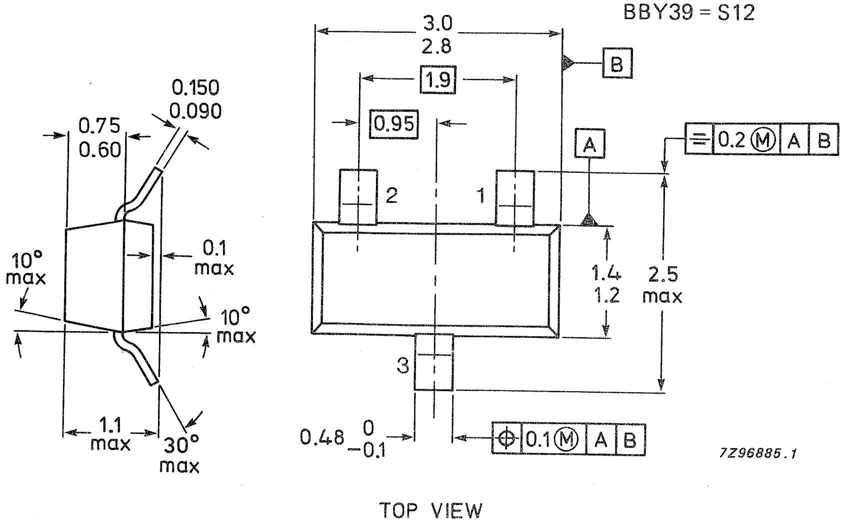
MECHANICAL DATA

Fig. 1 SOT-23.

Dimensions in mm

Marking code:
BBY39 = S12





RATINGS (for each diode)

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}	−65 to +100	°C
Operating junction temperature	T_j	max.	85 °C

THERMAL RESISTANCE

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

CHARACTERISTICS (for each diode)

T_j = 25 °C unless otherwise specified

Reverse current			
V_R = 28 V	I_R	<	10 nA
V_R = 28 V; T_j = 85 °C	I_R	<	100 nA
Diode capacitance at f = 1 MHz			
V_R = 1 V	C_d	typ.	17.5 pF
V_R = 28 V	C_d		1.6 to 2.0 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d\ (V_R = 1\ V)}{C_d\ (V_R = 28\ V)}$	>	8.0
Series resistance at f = 470 MHz and that value of V_R at which C_d = 9 pF	r_s	<	1.2 Ω

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm.

Variable capacitance diode BBY40

DESCRIPTION

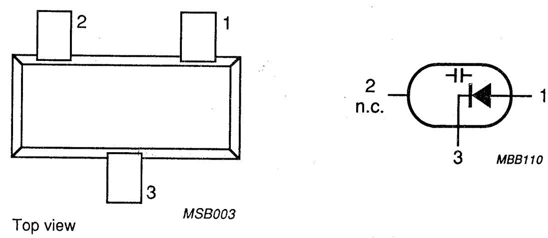
The BBY40 is a variable capacitance diode in a plastic SOT23 envelope. It is intended for electronic tuning in VHF television tuners with extended band I (FCC and OIRT norm).

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	reverse voltage		–	28	V
I_R	reverse current	V_R = 28 V	–	10	nA
C_d	diode capacitance	V_R = 3 V; f = 1 MHz	26	32	pF
		V_R = 25 V; f = 1 MHz	4.3	6	pF
$C_{3\,V}/C_{25\,V}$	capacitance ratio	f = 1 MHz	5	6.5	
R_s	series resistance	f = 200 MHz; note 1	–	0.7	Ω

Note

1. V_R is the value at which C_d = 25 pF.



Marking code: BBY40 = S2.

Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	28	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–55	100	°C
T_j	junction operating temperature		–	85	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient (note 1)	430 K/W

Note

1. Device mounted on a ceramic substrate, 7 x 5 x 0.5 mm.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_R	reverse current	V_R = 28 V	–	10	nA
		V_R = 28 V; T_j = 85 °C	–	100	nA
C_d	diode capacitance	V_R = 3 V; f = 1 MHz	26	32	pF
		V_R = 25 V; f = 1 MHz	4.3	6	pF
$C_{3\ V}/C_{25\ V}$	capacitance ratio	f = 1 MHz	5	6.5	
R_s	series resistance	f = 200 MHz; note 1	–	0.7	Ω

Note

1. V_R is the value at which C_d = 25 pF.

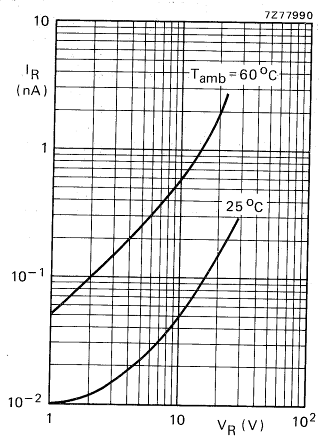
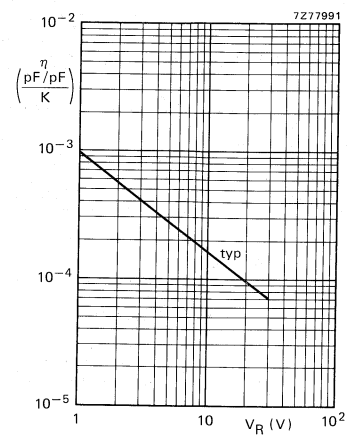
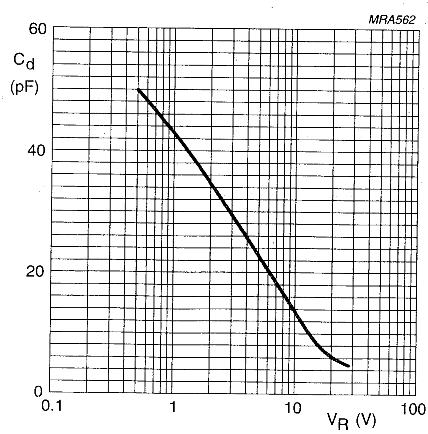


Fig.2 Reverse current as a function of reverse voltage, typical values.



T_{amb} = 0 to 85 °C.

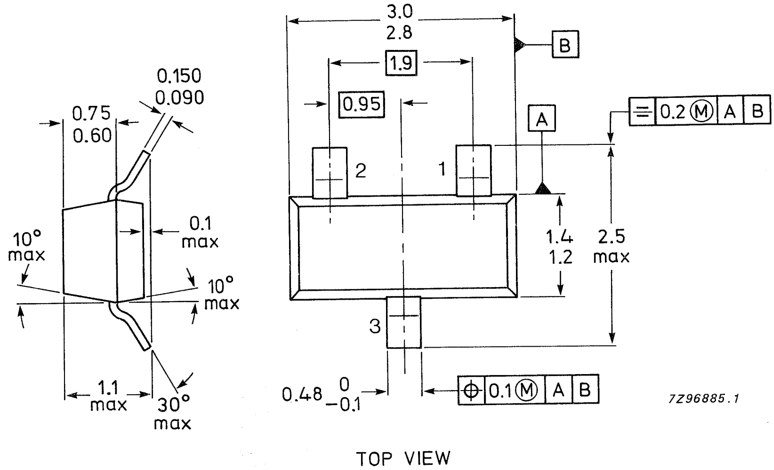
Fig.3 Temperature coefficient of diode capacitance.



f = 1 MHz; T_j = 25 °C.

Fig.4 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.5 SOT23.

V.H.F. VARIABLE CAPACITANCE DIODE

The BBY42 is a variable capacitance diode in a microminiature plastic envelope SOT-23. It is intended for use in v.h.f. TV tuners and CATV applications using SMD technology.

QUICK REFERENCE DATA

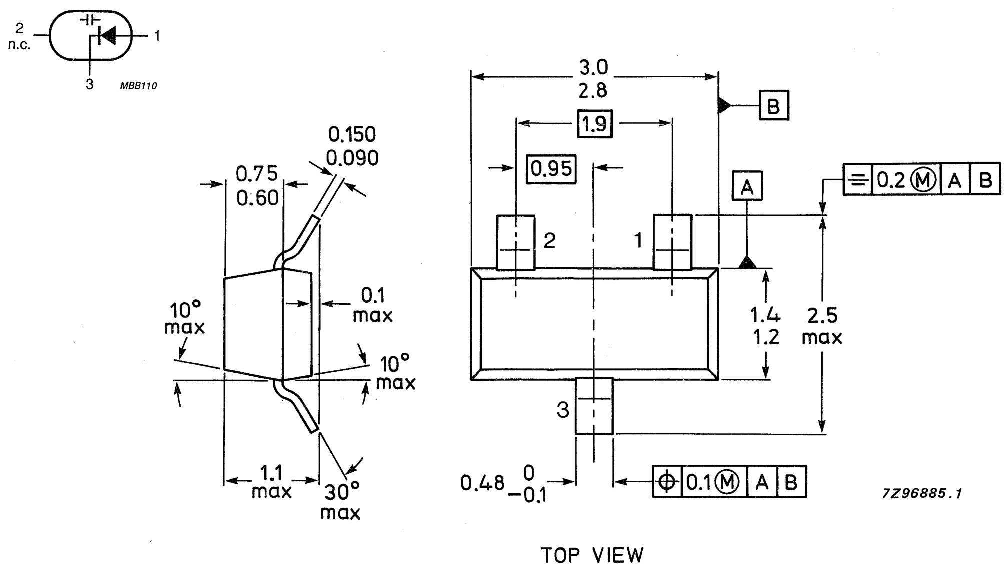
Reverse voltage, peak value	V_{RM}	max.	32 V
Reverse current $V_R = 28$ V	I_R	max.	10 nA
Diode capacitance at f = 1 MHz $V_R = 28$ V	C_d		2,4 to 3,0 pF
Capacitance ratio at f = 1 MHz	$\frac{C_d (V_R = 1\ V)}{C_d (V_R = 28\ V)}$		12 to 16
Series resistance at f = 100 MHz V_R is that value at which $C_d = 30$ pF	r_s	typ. max.	0,9 Ω 1,0 Ω

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOT-23.

Marking code: S13



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}	−65 to + 100		°C
Operating junction temperature	T_j	max.	85	°C

THERMAL RESISTANCE

From junction to ambient and mounted on a ceramic substrate of 8 mm x 10 mm x 0,7 mm	$R_{th\,j\text{-}a}$	=	430	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Reverse current				
V_R = 28 V	I_R	<	10	nA
V_R = 28 V; T_j = 85 °C	I_R	<	200	nA
Diode capacitance at f = 1 MHz				
V_R = 1 V	C_d	>	31	pF
V_R = 3 V	C_d	typ.	24	pF
V_R = 28 V	C_d		2,4 to 3,0	pF
Capacitance ratio at f = 1 MHz	$\frac{C_d(V_R = 1\ V)}{C_d(V_R = 28\ V)}$		12 to 16	
Series resistance at f = 100 MHz and at that value of V_R at which C_d = 30 pF	r_s	typ.	0,9	Ω
	r_s	<	1,0	Ω

Double variable capacitance diode BBY62

DESCRIPTION

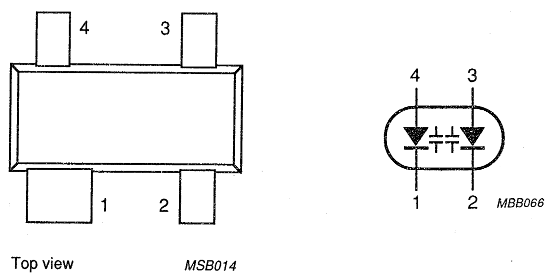
The BBY62 is a double variable capacitance diode in a microminiature SOT143 envelope. It is intended for application in electronic tuners using SMD technology.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per diode						
V_R	reverse voltage		–	–	28	V
I_R	reverse current	V_R = 28 V	–	–	10	nA
C_d	diode capacitance	V_R = 28 V; f = 1 MHz	1.6	–	2	pF
$C_{1\,V}/C_{28\,V}$	capacitance ratio	f = 1 MHz	–	8.3	–	
R_s	series resistance	f = 470 MHz; note 1	–	–	1.2	Ω

Note

1. V_R is the value at which C_d = 9 pF.



Marking code: BBY62 = S4.

Fig.1 Simplified outline (SOT143) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
Per diode					
V_R	continuous reverse voltage		–	28	V
V_{RM}	reverse voltage	peak value	–	30	V
I_F	forward current	DC value	–	20	mA
T_{stg}	storage temperature range		–65	100	°C
T_j	junction operating temperature		–	85	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient (note 1)	430 K/W

Note

1. Device mounted on a ceramic substrate, 8 x 10 x 0.7 mm.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Per diode						
I_R	reverse current	V_R = 28 V	–	–	10	nA
		V_R = 28 V; T_j = 85 °C	–	–	1	μA
C_d	diode capacitance	V_R = 1 V; f = 1 MHz	–	15	–	pF
		V_R = 28 V; f = 1 MHz	1.6	–	2	pF
$C_{1\ V}/C_{28\ V}$	capacitance ratio	f = 1 MHz	–	8.3	–	
R_s	series resistance	f = 470 MHz; note 1	–	–	1.2	Ω

Note

1. V_R is the value at which C_d = 9 pF.

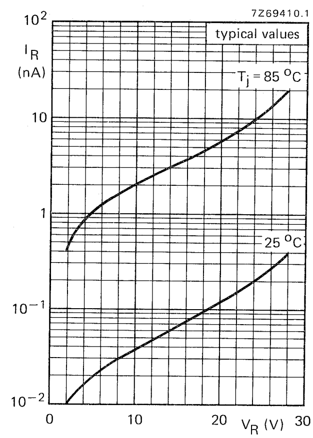


Fig.2 Reverse current as a function of reverse voltage, typical values.

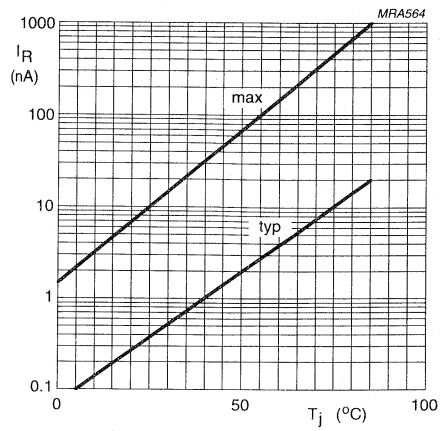


Fig.3 Reverse current as a function of junction temperature.

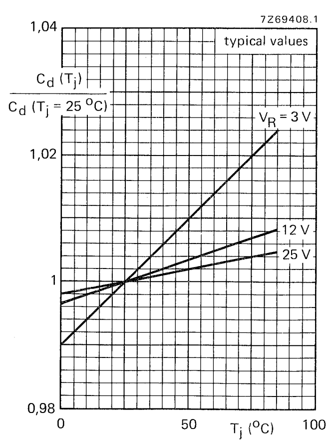


Fig.4 Diode capacitance as a function of junction temperature, typical values.

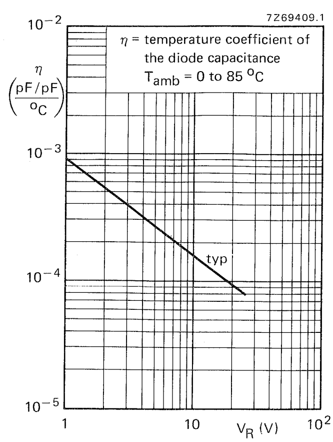
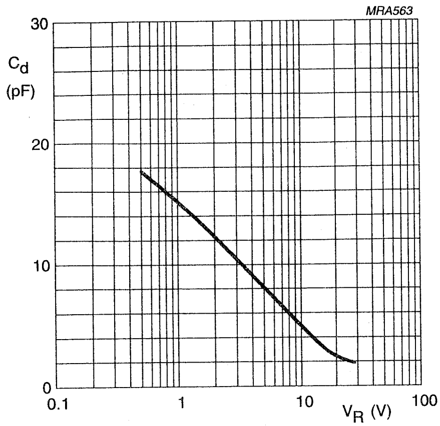


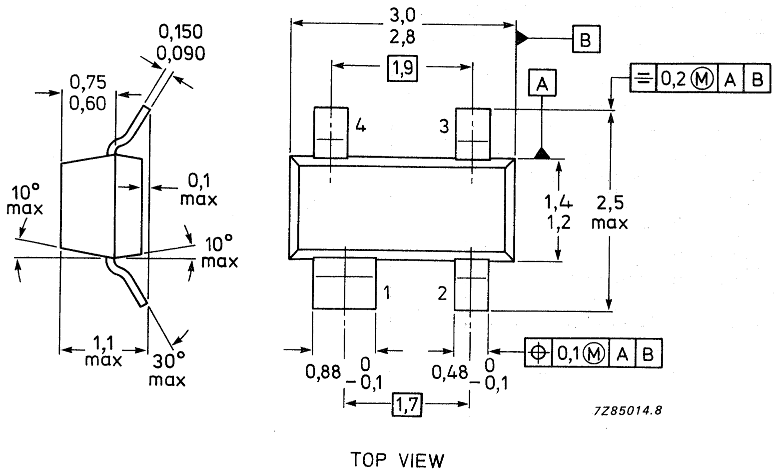
Fig.5 Temperature coefficient of diode capacitance.



f = 1 MHz; T_j = 25 °C.

Fig.6 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

Fig.7 SOT143.

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.

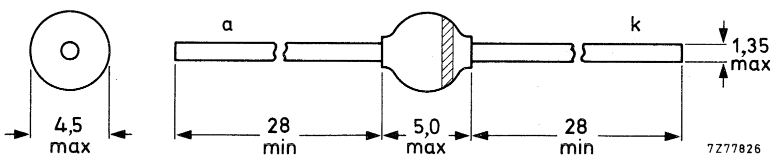
QUICK REFERENCE DATA

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 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

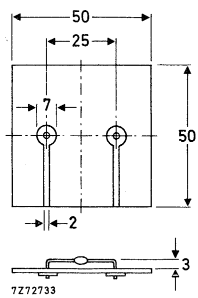


Fig. 2.

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.

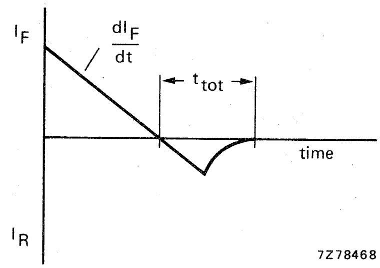


Fig. 3 Definition of t_{tot}.

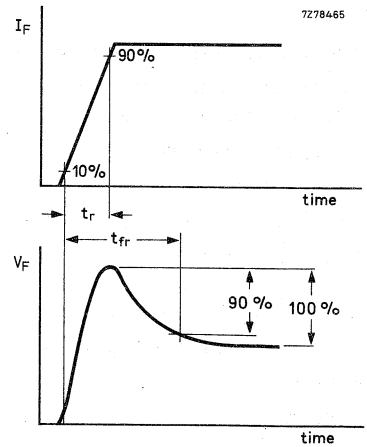


Fig. 4 Definition of t_{fr}.

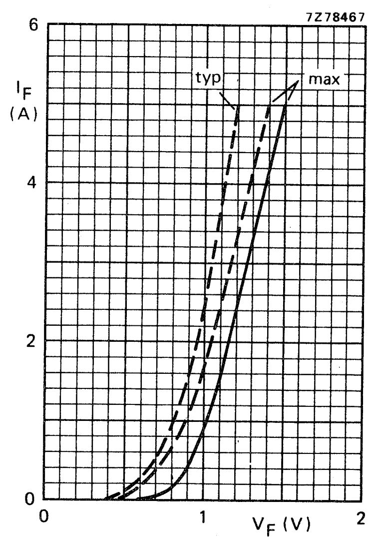


Fig. 5 —— T_j = 25 °C;
– – – T_j = 140 °C.

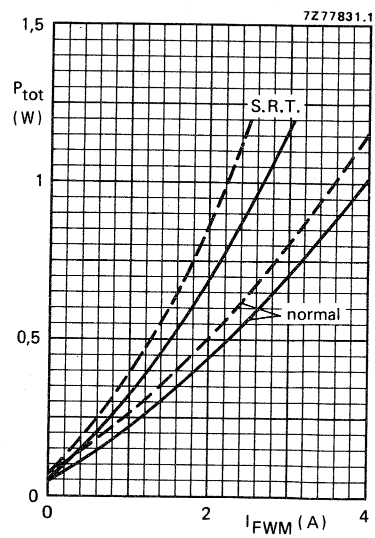


Fig. 6 P_{tot} = power dissipation including switching losses:
– – – – 819 lines; ——— 625 lines;
S.R.T. = self regulating time-base circuit;
normal = conventional deflection circuit or high-voltage E–W modulator circuit;
I_{FWM} is the **nominal** diode current, for tolerances and spreads 25% safety 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.

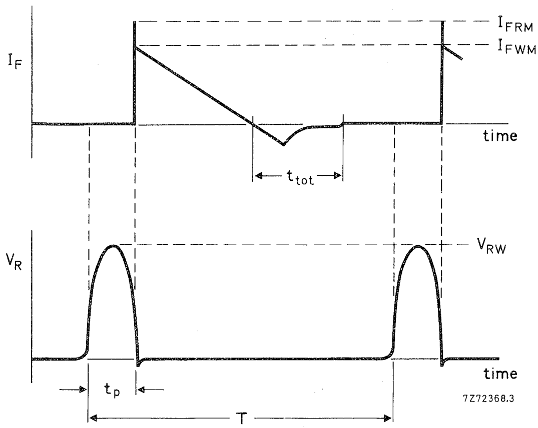


Fig. 7 Basic waveforms.

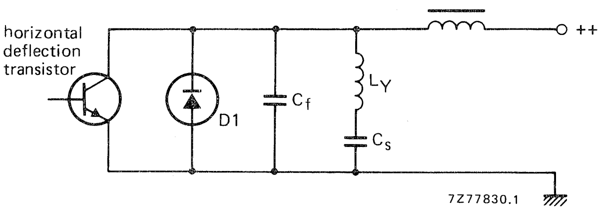


Fig. 8 Basic conventional horizontal deflection circuit. D_1 = BY228.

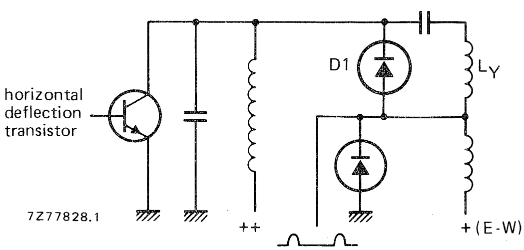


Fig. 9 Basic high-voltage E–W modulator circuit. D_1 = BY228.

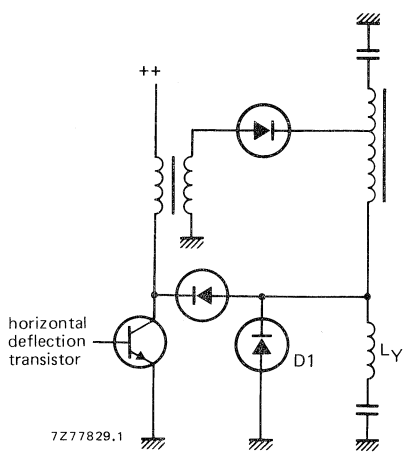


Fig. 10 Basic self-regulating time base circuit (S.R.T.). D_1 = BY228.

32 kHz PARALLEL EFFICIENCY DIODE

Double-diffused glass passivated rectifier diode in an hermetically sealed axial-leaded glass envelope, intended for use as an efficiency diode in transistorized horizontal deflection circuits of television receivers with line frequency up to 32 kHz. The device features high reverse voltage capability with controlled recovery time and fast turn-on.

QUICK REFERENCE DATA

Repetitive peak reverse voltage	V_{RRM}	max.	1400	V
Working peak forward current	I_{FWM}	max.	6	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Total reverse recovery time	t_{tot}	max.	13	μs

MECHANICAL DATA

Dimensions in mm

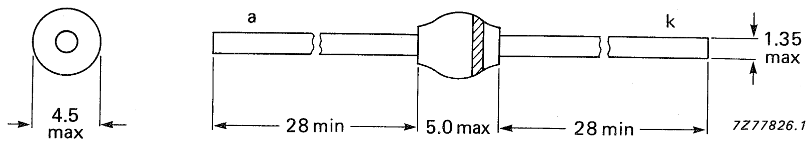


Fig. 1 SOD-64.

The marking band indicates the cathode.

RATINGS

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

Non-repetitive peak reverse voltage during flash-over of picture tube	V_{RSM}	max.	1500	V
Repetitive peak reverse voltage	V_{RRM}	max.	1400	V
Working reverse voltage	V_{RW}	max.	1300	V*
Working peak forward current				
T_{tp} = 55 °C; leadlength 10 mm	I_{FWM}	max.	6	A
T_{amb} = 55 °C; Fig. 3	I_{FWM}	max.	4.7	A
T_{amb} = 55 °C; Fig. 2	I_{FWM}	max.	3	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current t = 10 ms; half sinewave; T_j = 150 °C prior to surge; with reapplied V_{RWmax}.	I_{FSM}	max.	60	A
Storage temperature range	T_{stg}		−65 to +175	°C
Junction temperature	T_j	max.	150	°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 epoxyglass printed-circuit board; Cu-thickness ≥ 40 μm; Fig. 2 (see "Thermal Model")	$R_{th\ j\text{-}a}$	75	K/W
3. Thermal resistance from junction to ambient when mounted as shown in Fig. 3	$R_{th\ j\text{-}a}$	40	K/W

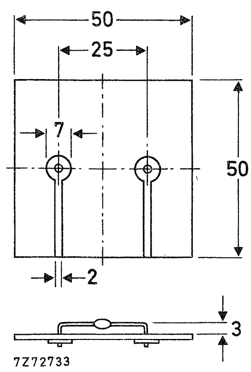


Fig. 2 Mounted on a printed-circuit board.

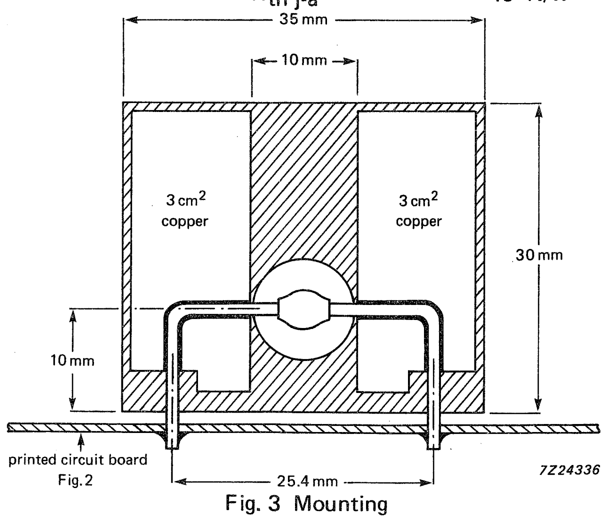


Fig. 3 Mounting

* V_{RW} 1400 V allowed only for a short period, e.g. during adjusting.

CHARACTERISTICS

Forward voltage *			
$I_F = 5$ A; $T_j = 25$ °C	V_F	<	1.45 V
Reverse current			
$V_R = V_{RWmax}$; $T_j = 150$ °C	I_R	<	150 μA
Total reverse recovery time when switched from $I_F = 1$ A; $-dI_F/dt = 0.05$ A/μs; $T_j = 150$ °C	t_{tot}	<	13 μs
Forward recovery time when switched to $I_F = 5$ A with $t_r = 50$ ns; $T_j = 150$ °C	t_{fr}	<	0.5 μs

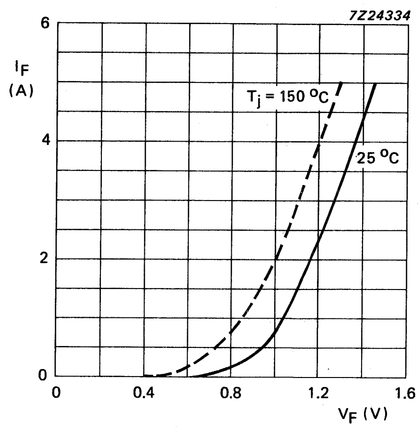


Fig. 4 Maximum forward voltage drop.

* Measured under pulse conditions to avoid excessive dissipation.

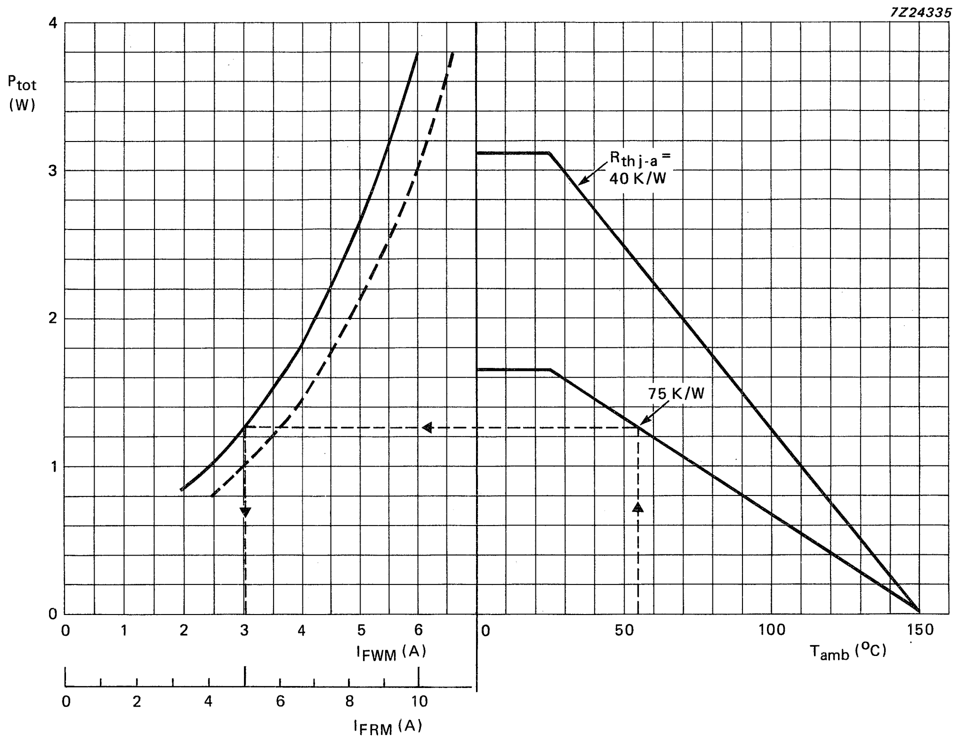


Fig. 5 Total power dissipation, including switching losses, as a function of I_{FWM}; I_{FRM}; and T_{amb}.
——— Basic high-voltage E-W modulator circuit, see Fig. 10.
– – – – Basic conventional horizontal deflection circuit, see Fig. 9.

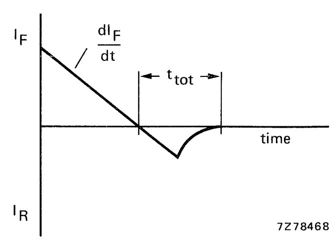


Fig. 6 Definition of t_{tot}.

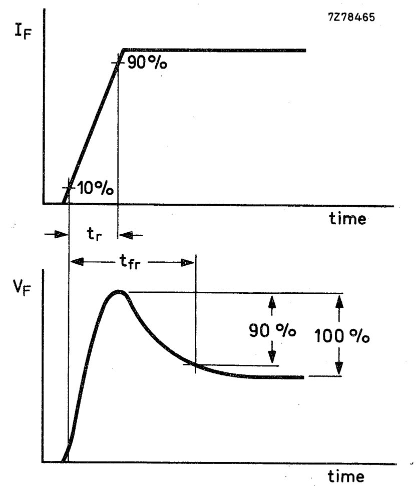


Fig. 7 Definition of t_{fr}.

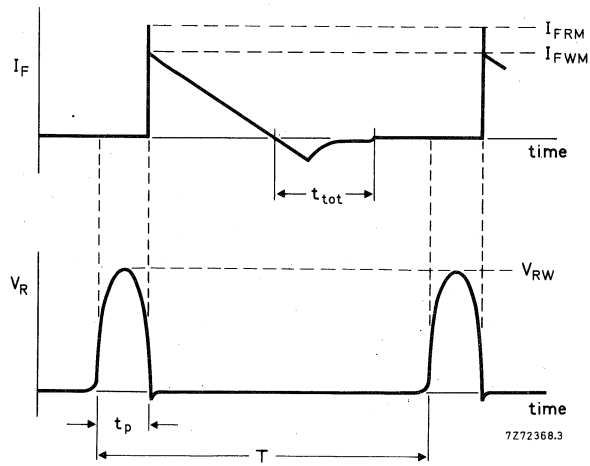


Fig. 8 Basic waveforms.

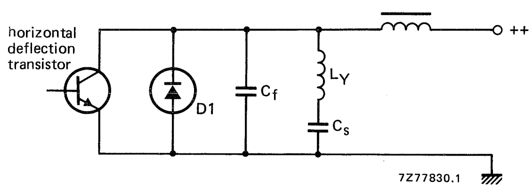


Fig. 9 Basic conventional horizontal deflection circuit. D1 = BY328.

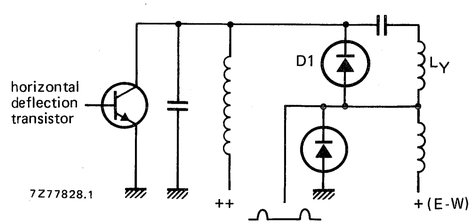


Fig. 10 Basic high-voltage E-W modulator circuit. D1 = BY328.

Very fast parallel efficiency diode BY428

DESCRIPTION

Double-diffused glass passivated rectifier diode in a hermetically sealed, axial-leaded glass SOD64 envelope, intended for use as an efficiency diode in high frequency horizontal deflection circuits. The device features high reverse voltage capability with controlled recovery time and fast turn-on.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	1400	V
I_{FWM}	working peak forward current	4	A
I_{FRM}	repetitive peak forward current	8	A
$t_{rr\ tot}$	total reverse recovery time	6	μs

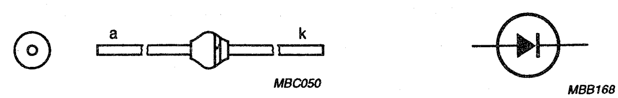


Fig.1 Simplified outline (SOD64) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		–	1400	V
V_{RSM}	non-repetitive peak reverse voltage		–	1500	V
V_{RW}	working reverse voltage	note 1	–	1300	V
I_{FWM}	working peak forward current		–	4	A
I_{FRM}	repetitive peak forward current		–	8	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine-wave; T_j = 150 °C prior to surge; with reapplied $V_{RW\ max}$	–	50	A
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	150	°C

Note

1. V_{RW} at 1400 V is only allowed for a short period, e.g. during adjustment.

Very fast parallel efficiency diode BY428

THERMAL RESISTANCE

Influence of mounting method.

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	25 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	75 K/W
		note 2	40 K/W

Notes

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≥ 40 μm, see Fig.2.
2. Device mounted as shown in Fig.3.

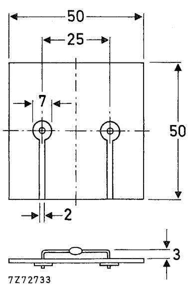


Fig.2 Device mounted on a printed circuit board.

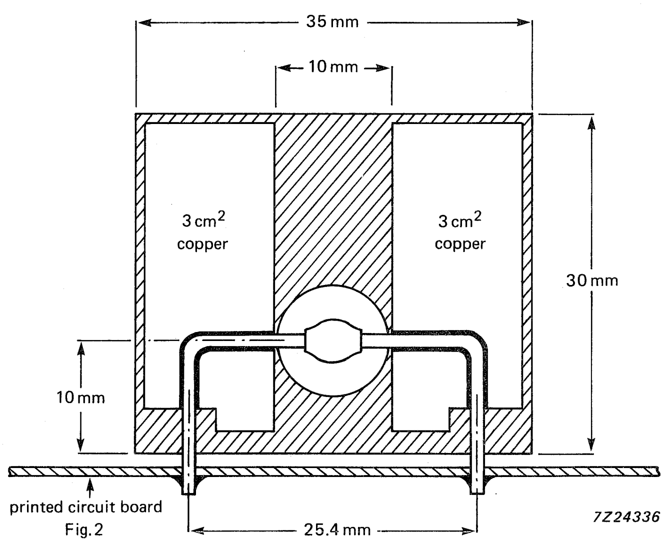


Fig.3 Mounting.

CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	$I_F = 4$ A; $T_j = 25$ °C; note 1	1.95	V
I_R	reverse current	$V_R = V_{RW\ max}$; $T_j = 150$ °C	150	µA
$t_{rr\ tot}$	total reverse recovery time	switched from $I_F = 1$ A; $-dI_F/dt = 0.05$ A/µs; $T_j = 150$ °C	6	µs
t_{fr}	forward recovery time	when switched to $I_F = 5$ A with $t_r = 50$ ns; $T_j = 150$ °C	0.5	µs

Note

1. Measured under pulse conditions to avoid excessive dissipation.

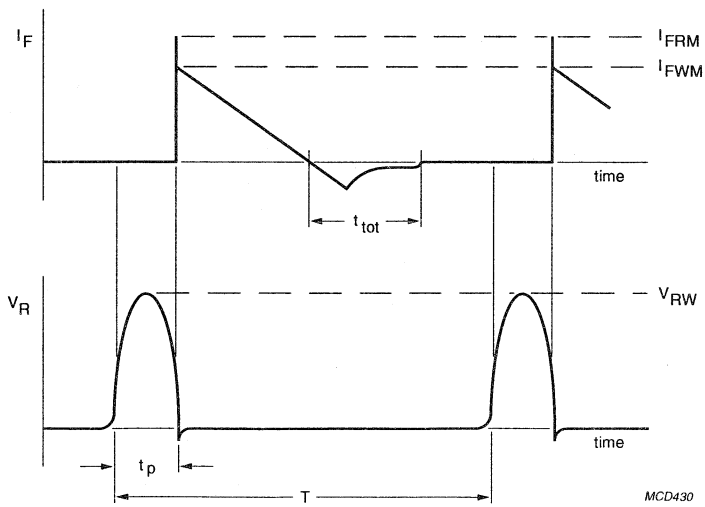
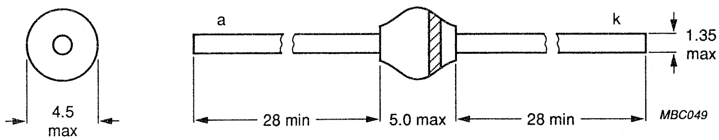


Fig.4 Basic waveforms.

PACKAGE OUTLINE



Dimensions in mm.

Fig.5 SOD64.

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.

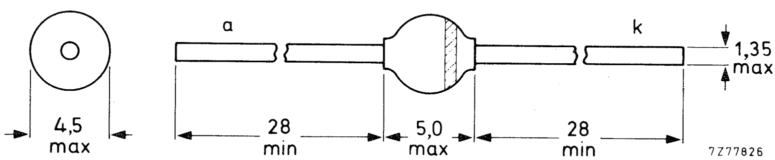
QUICK REFERENCE DATA

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

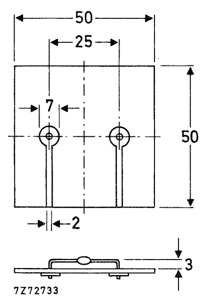


Fig. 2.

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.

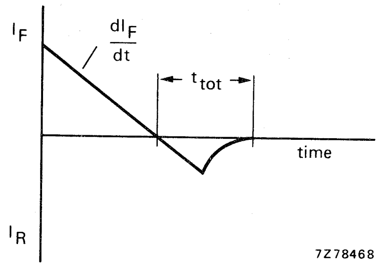


Fig. 3 Definition of t_{tot}.

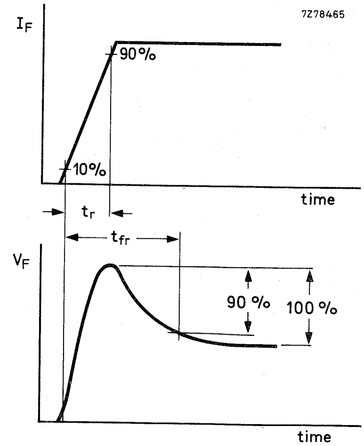


Fig. 4 Definition of t_{fr}.

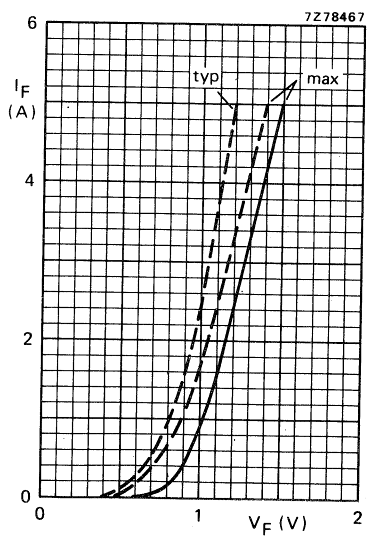


Fig. 5 —— $T_j = 25\ ^oC$; ---- $T_j = 140\ ^oC$.

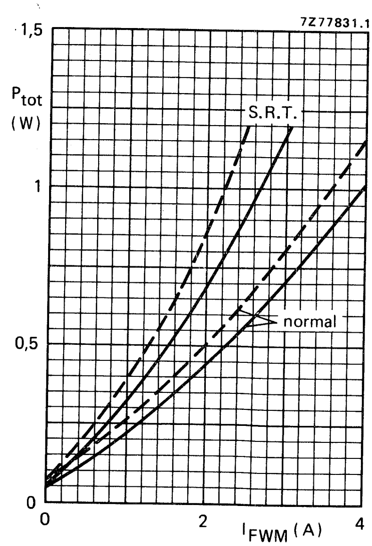


Fig. 6 P_{tot} = power dissipation including switching losses; – – – 819 lines; —— 625 lines; S.R.T. = self regulating time-base circuit; normal = conventional deflection circuit or high-voltage E–W modulator circuit; I_{FWM} is the **nominal** diode current, for tolerances and spreads 25% safety margin 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.

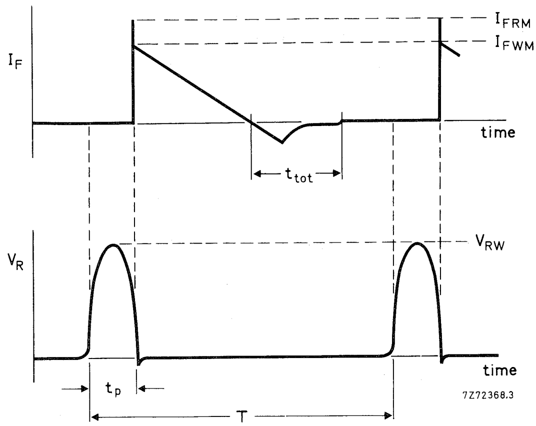


Fig. 7 Basic waveforms.

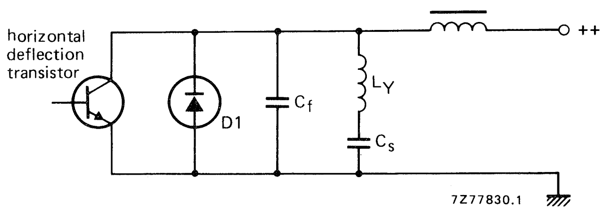


Fig. 8 Basic conventional horizontal deflection circuit. D1 = BY438.

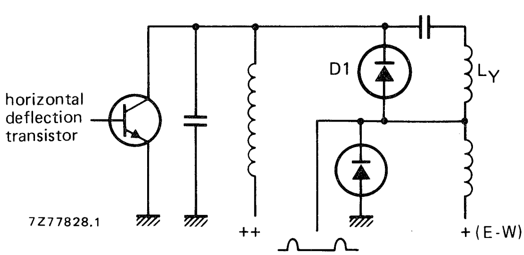


Fig. 9 Basic high-voltage E—W modulator circuit. D1 = BY438.

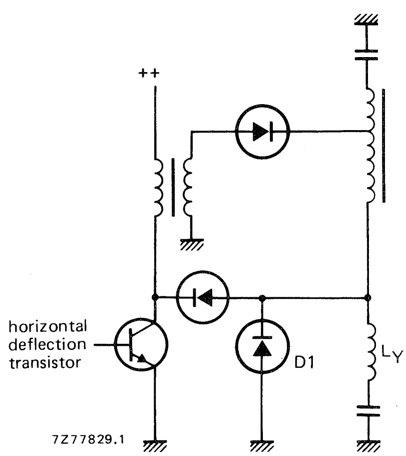


Fig. 10 Basic self-regulating time base circuit (S.R.T.). D1 = BY438.

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.

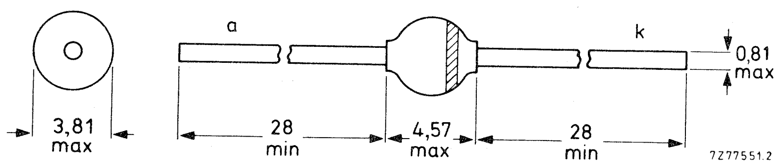
QUICK REFERENCE DATA

			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

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

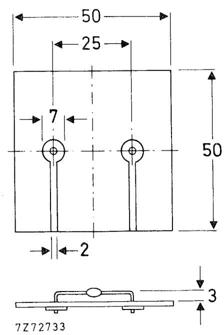


Fig. 2.

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

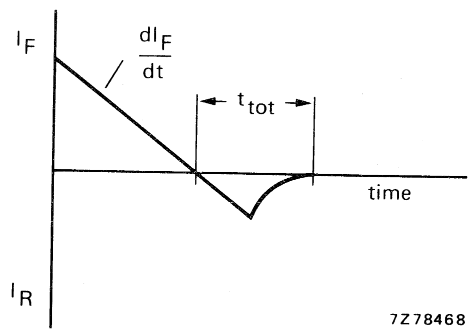


Fig. 3 Definition of t_{tot}.

* 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

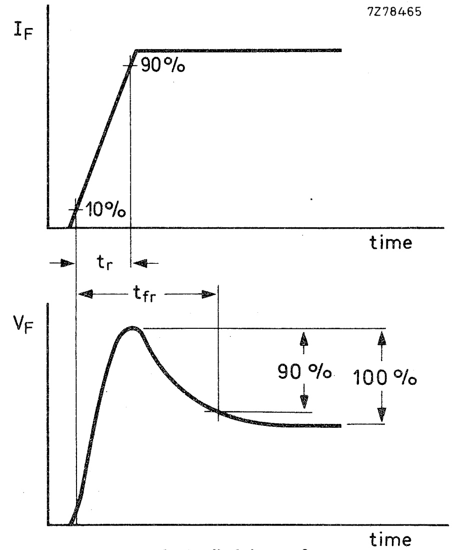


Fig. 4 Definition of t_{fr}.

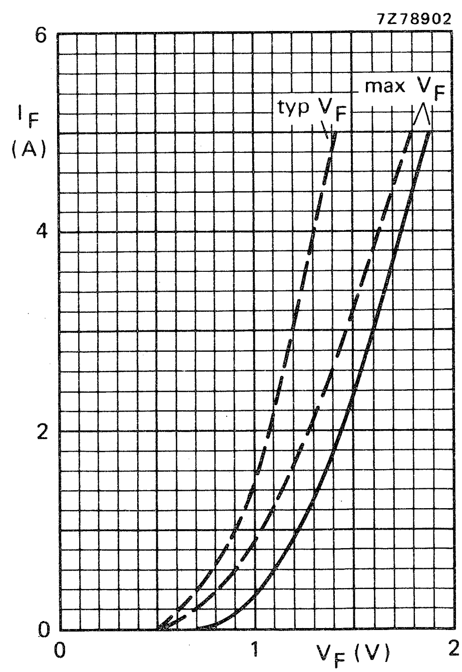


Fig. 5 —— T_j = 25 °C; – – – T_j = 140 °C.

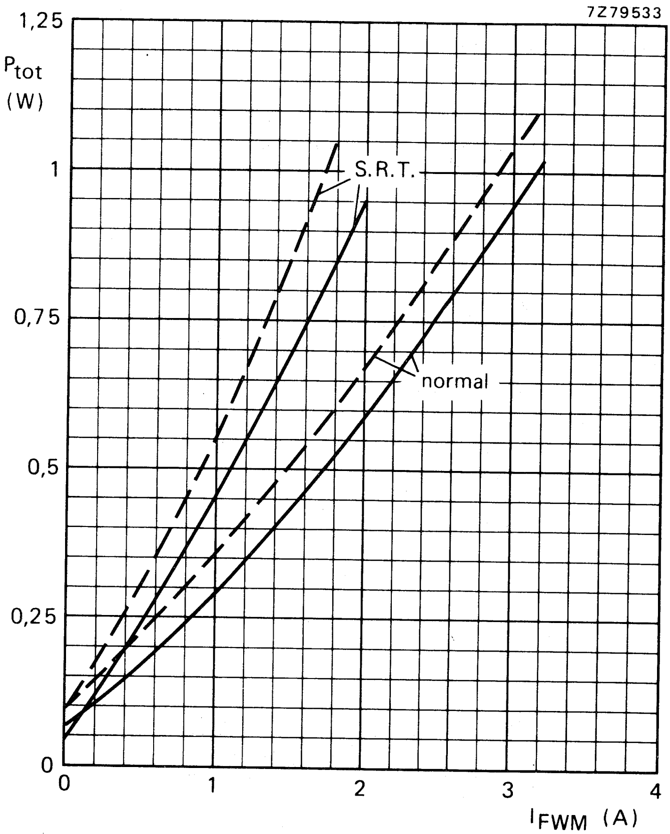


Fig. 6 P_{tot} = maximum power dissipation including switching losses; – – – 819 lines; —— 625 lines; S.R.T. = self regulating time-base circuit; normal = conventional deflection circuit or high-voltage E-W modulator circuit; I_{FWM} = the **nominal** peak diode current, for tolerances and spreads 25% 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.

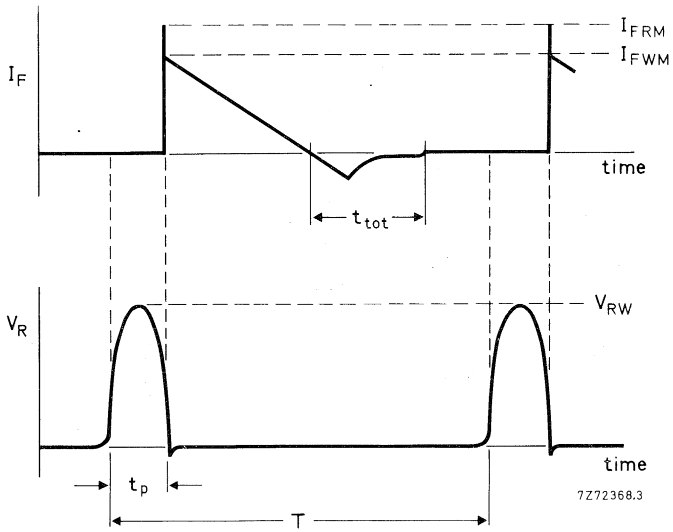


Fig. 7 Basic waveforms.

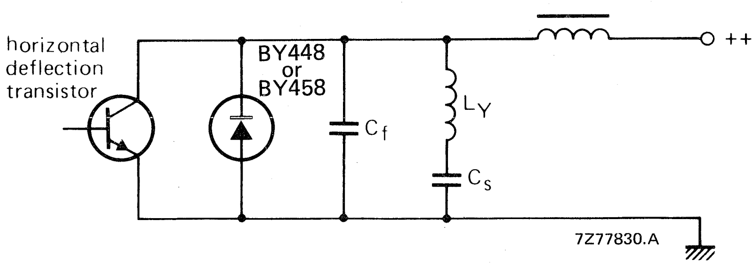


Fig. 8 Basic conventional horizontal deflection circuit.

APPLICATION INFORMATION (continued)

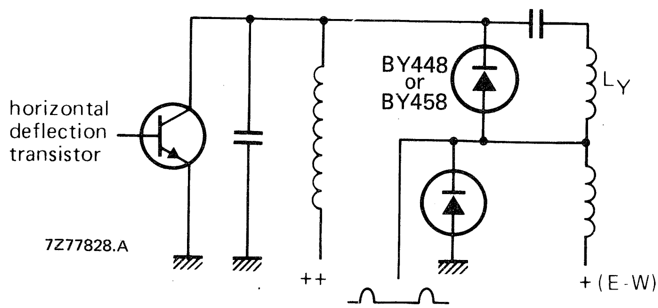


Fig. 9 Basic high-voltage E—W modulator circuit.

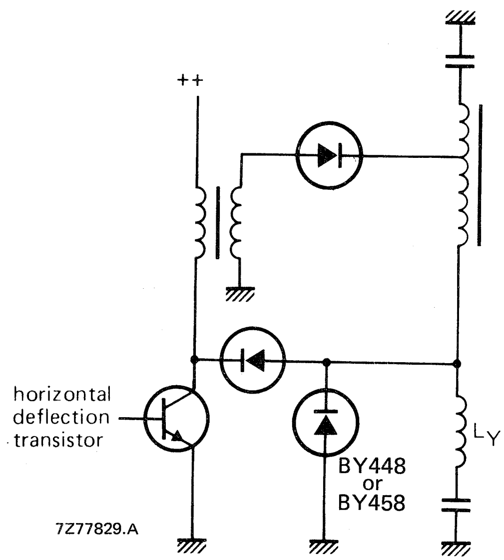


Fig. 10 Basic self-regulating time base circuit (S.R.T.).

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

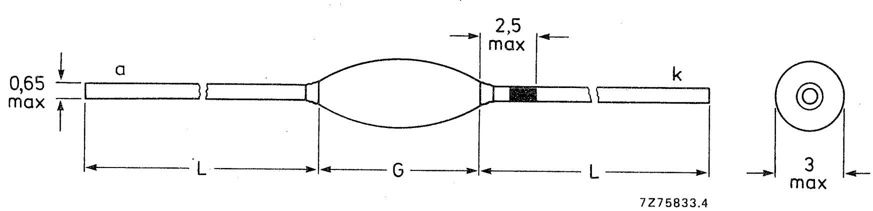
Working reverse voltage	V_{RW}	max.	2000	V
Repetitive peak reverse voltage	V_{RRM}	max.	2200	V
Average forward current	$I_{F(AV)}$	max.	85	mA
Repetitive peak forward current	I_{FRM}	max.	800	mA
Junction temperature	T_j	max.	120	°C
Reverse recovery charge	Q_s	<	1,0	nC

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

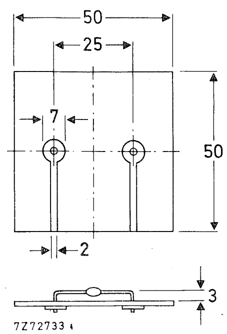


Fig. 2 Mounted on a printed-circuit board.

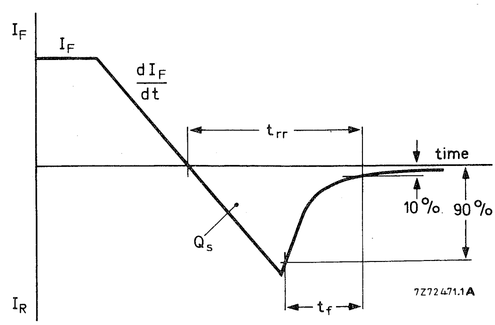


Fig. 3 Definitions of Q_s, t_{rr} and t_f.

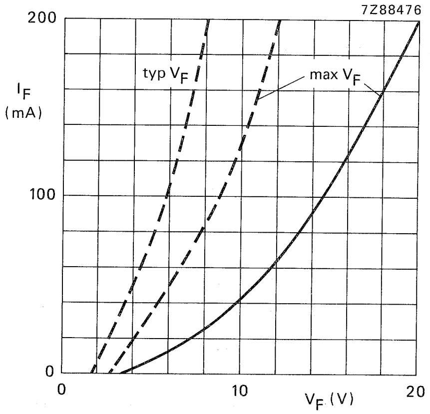


Fig. 4 —— T_j = 25 °C; – – – T_j = 120 °C.

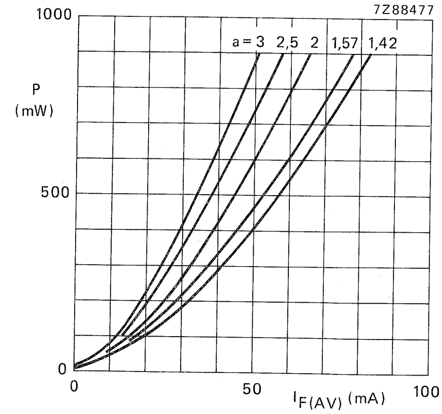


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $\delta = 0{,}5$.

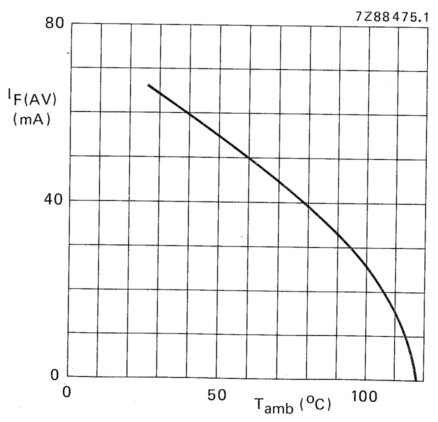


Fig. 6 Maximum permissible average forward current as a function of the ambient temperature; The graph is for switched-mode application. $V_R = V_{RWmax}$, $\delta = 0{,}5$, a = 1,42, Mounting method see Fig. 2.

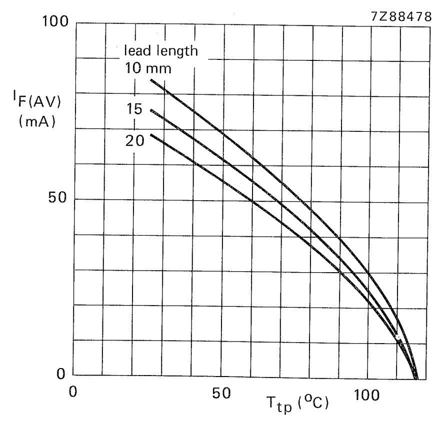


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RWmax}$; $\delta = 0{,}5$; a = 1,42.

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.

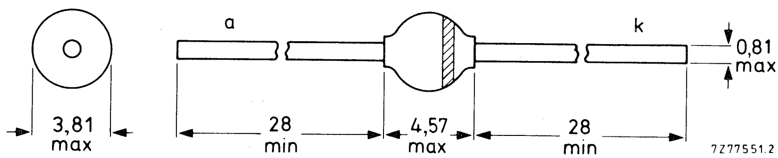
QUICK REFERENCE DATA

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	^oC

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 ($\delta \leqslant 1\%$)	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 $\geqslant$ 40 μm; Fig. 2 (see "Thermal model")	$R_{th\,j\text{-}a}$	=	100	K/W

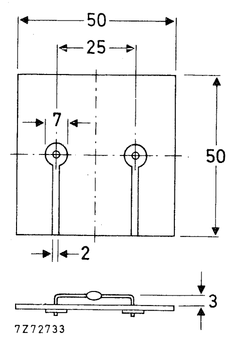


Fig. 2 Device mounted on a printed circuit board.

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

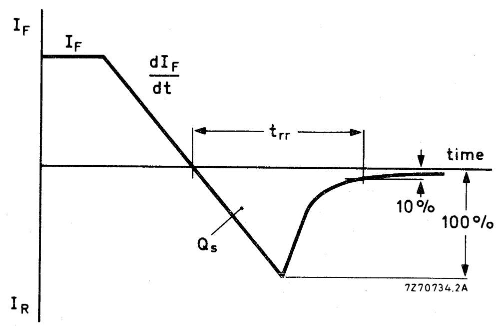


Fig. 3 Definitions of t_{rr} and Q_s.

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%.

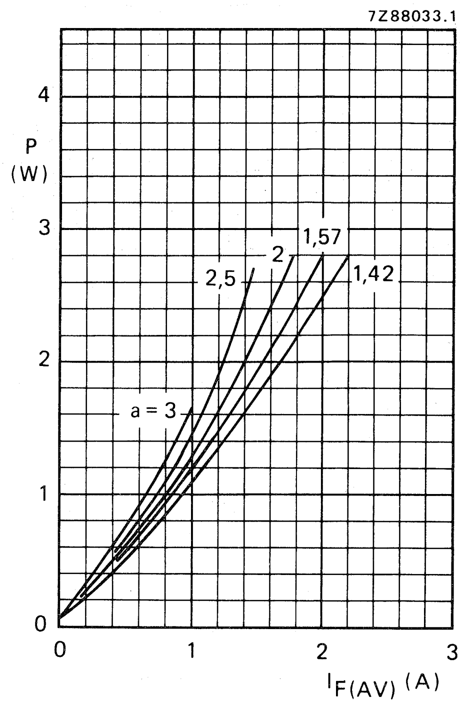


Fig. 4 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

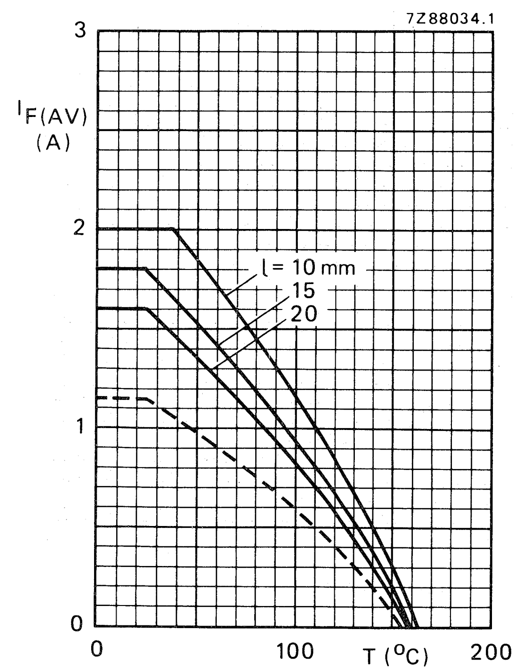


Fig. 5 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.

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.

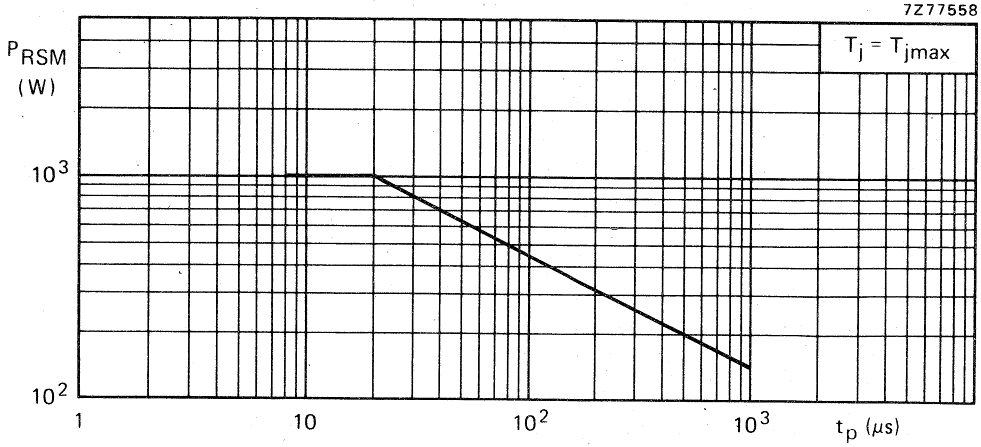
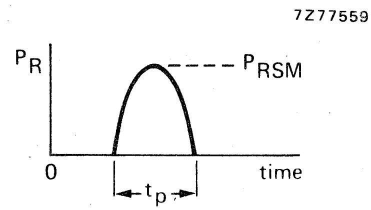


Fig. 6 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



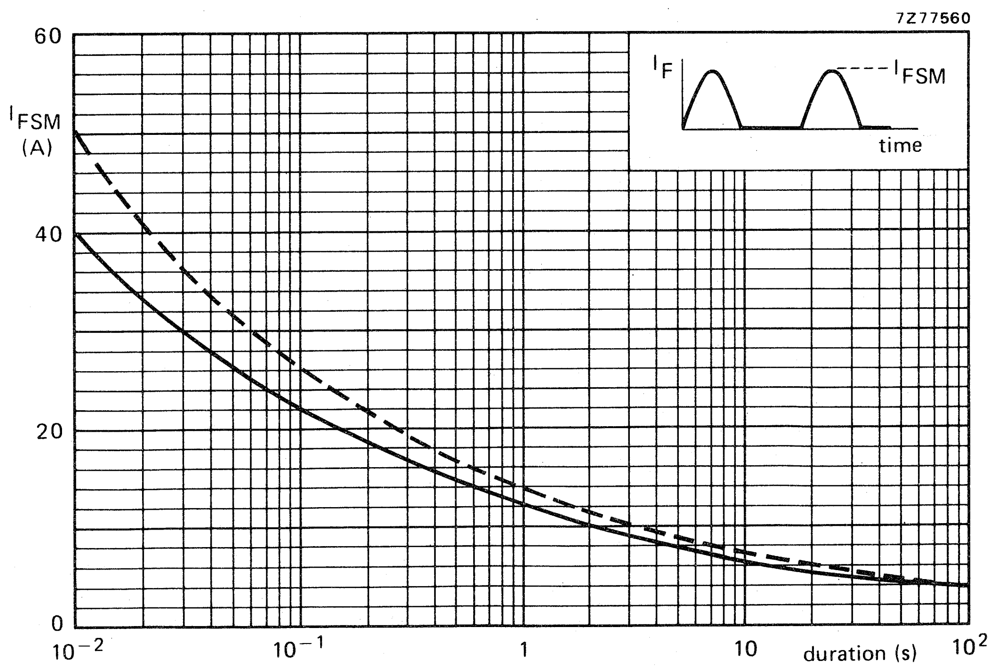


Fig. 7 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz)

---- $T_j = 25\ ^oC$; $V_R = 0$.

—— $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWMmax}$.

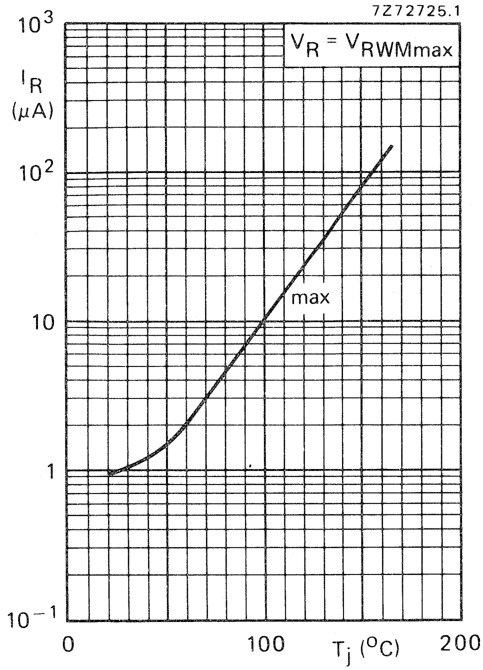


Fig. 8.

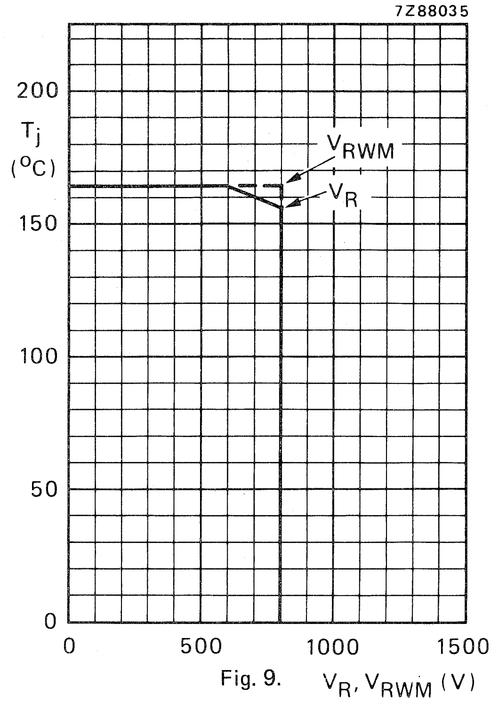


Fig. 9. f = 50 Hz; sine-wave; $R_{th\ j\text{-}a}$ = 100 K/W.

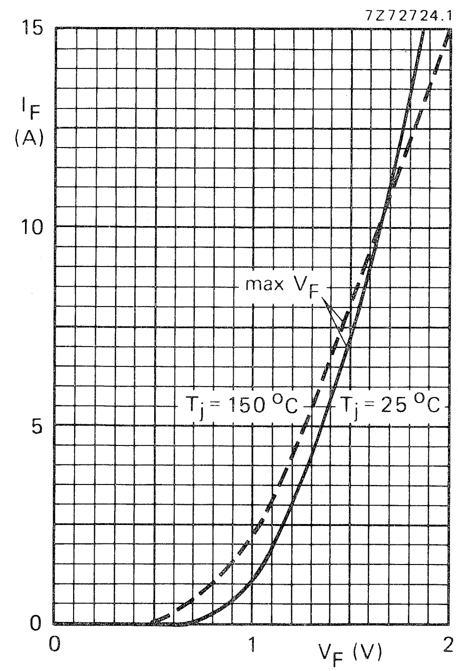


Fig. 10.

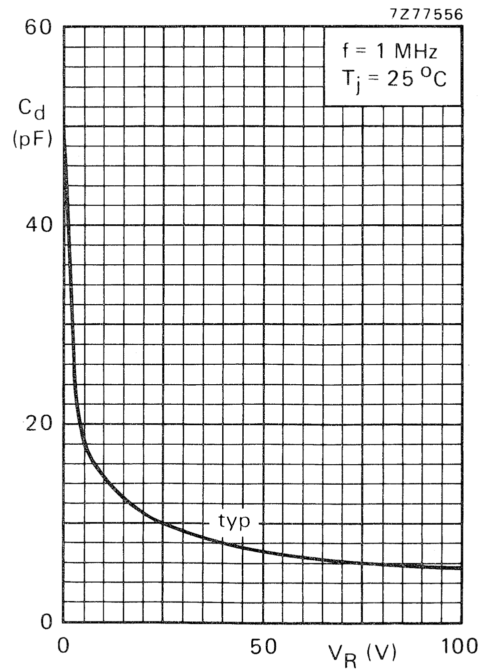


Fig. 11.

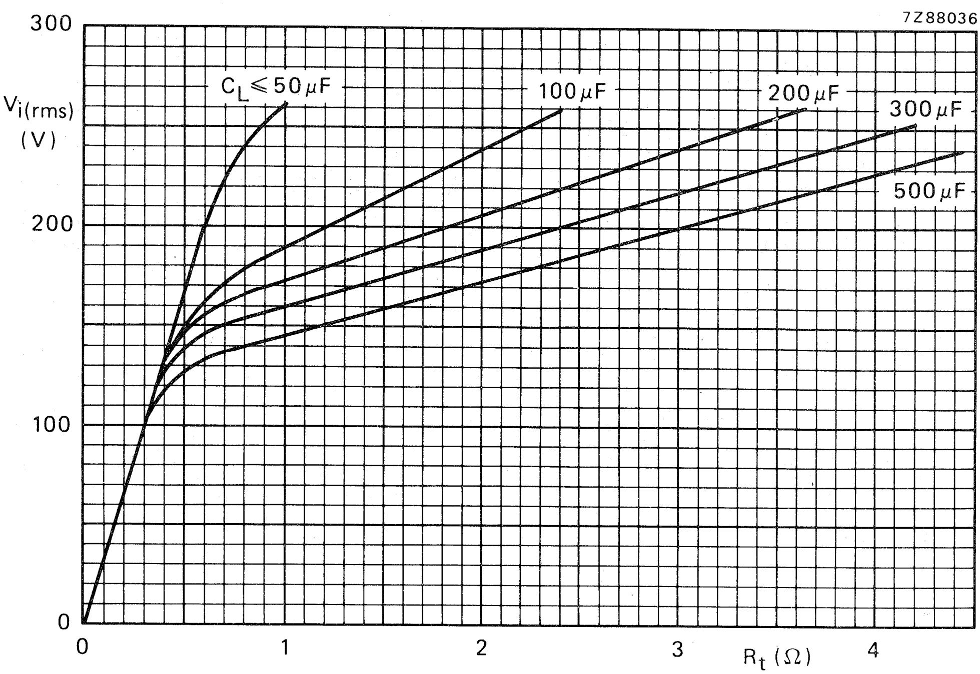


Fig. 12 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

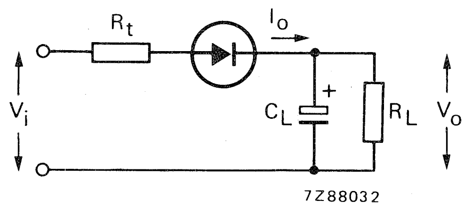


Fig. 13 Test circuit series resistance (R_t).

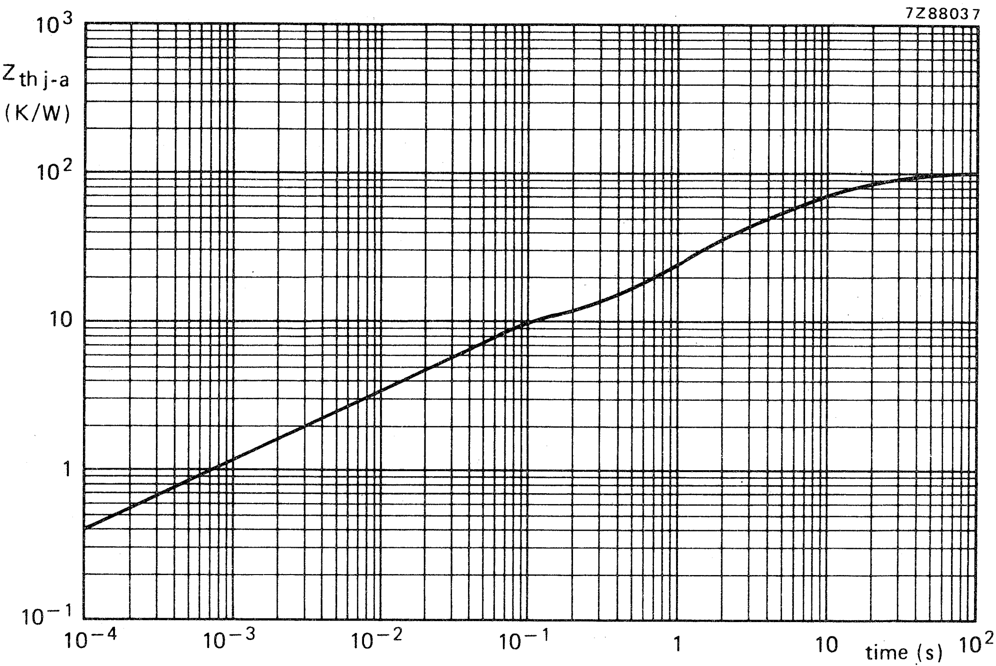


Fig. 14.

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

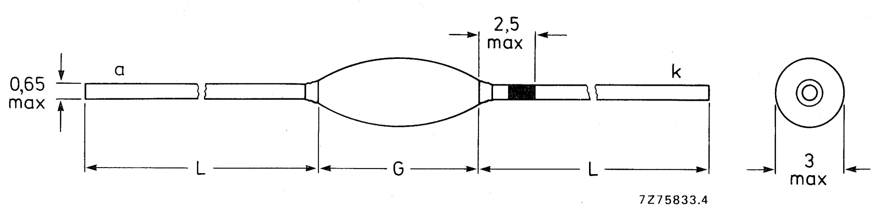
Working reverse voltage	V_{RW}	max.	1500 V
Repetitive peak reverse voltage	V_{RRM}	max.	1800 V
Average forward current	$I_{F(AV)}$	max.	85 mA
Repetitive peak forward current	I_{FRM}	max.	800 mA
Junction temperature	T_j	max.	120 °C
Reverse recovery charge	Q_s	<	1,0 nC

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-61A.

G = max. 4,9; L = min. 32,5.



The cathode is indicated by an orange band on the lead.

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. 9 and 11	$R_{th\,j\text{-}a}$	=	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

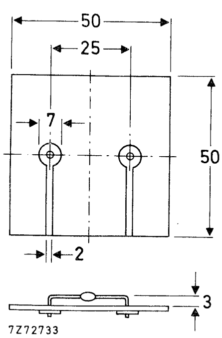


Fig. 2 Device mounted on a printed circuit board.

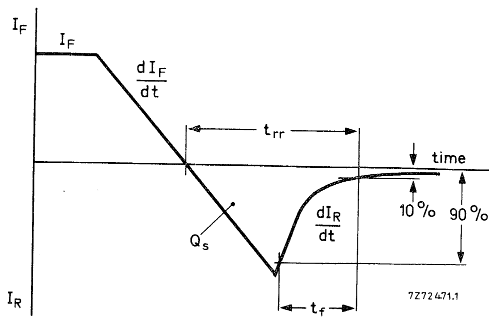


Fig. 3 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

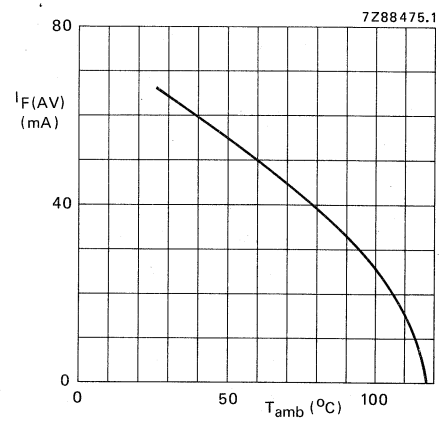


Fig. 4 Maximum permissible average forward current as a function of the ambient temperature; $V_R = V_{RWmax}$; a = 1,42, mounting Fig. 2.

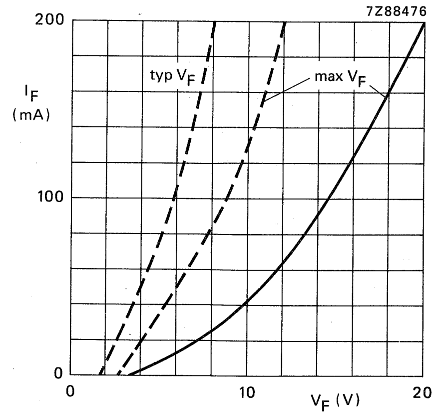


Fig. 5 —— T_j = 25 °C; - - - T_j = 120 °C.

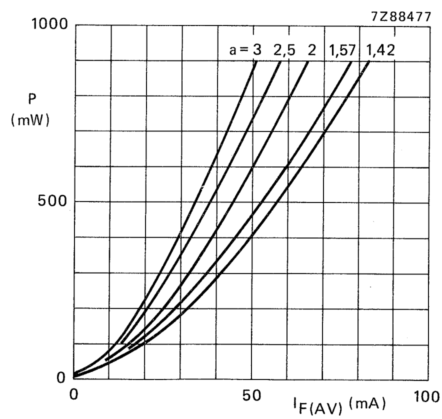


Fig. 6 Steady state power dissipation (forward plus leakage current but excluding switching losses) as a function of average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; δ = 0,5.

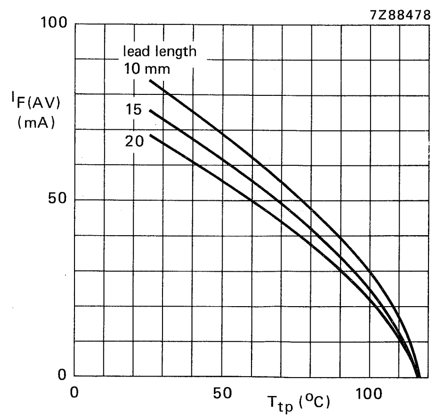


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

a = 1,42; $V_R = V_{RWmax}$; δ = 0,5*.

* Figs 4 and 7 apply to switched mode application.

APPLICATION INFORMATION

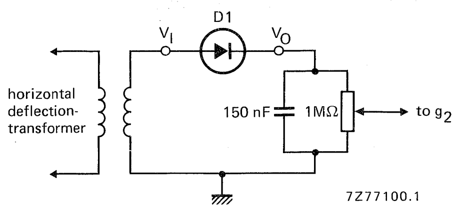


Fig. 8 Basic circuit for voltage supply of grid 2 incolour television picture tubes. D_1 = BY584. Stable continuous operation is ensured at an ambient temperature up to 70 °C.

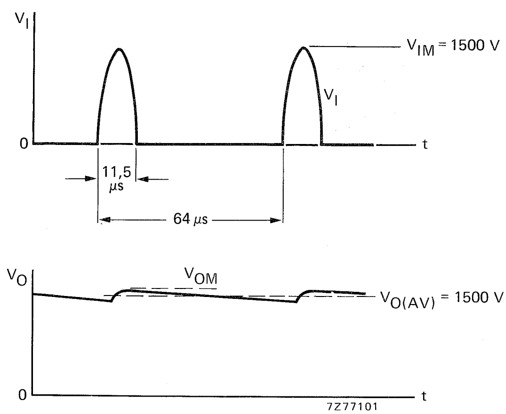


Fig. 9 Waveform.

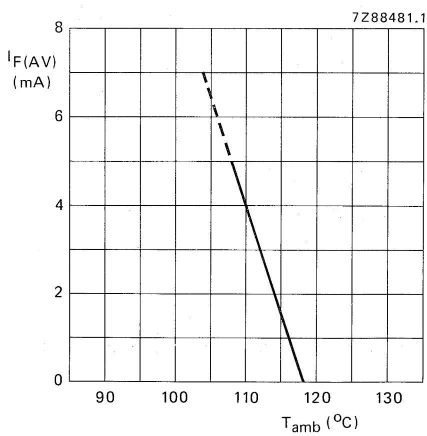


Fig. 10 Maximum permissible average forward current as a function of ambient temperature. V_R = 1500 V; diode used in circuit Fig. 8 mounted as in Fig. 2.

OPERATING NOTES

The various components of junction temperature rise above ambient, for mounting with symmetrical lead length, are illustrated below.

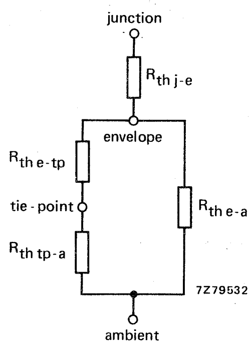


Fig. 11 Thermal model. $R_{th\ j-e} = 35$ K/W.

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
$R_{th\ e-tp}$	38	76	114	152	190	K/W
$R_{th\ e-a}$	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 $\geqslant 40\ \mu m$, the following values apply:

1. Mounted as given in Fig. 2 the thermal resistance $R_{th\ tp-a}$ is 70 K/W.
2. Mounted with copper laminate of 1 cm^2 per lead $R_{th\ tp-a}$ is 55 K/W.
3. Mounted with copper laminate of 2,25 cm^2 per lead $R_{th\ tp-a}$ is 45 K/W.

Note

Any temperature can be calculated by using the dissipation graph (Fig. 6) and the above thermal model.

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).

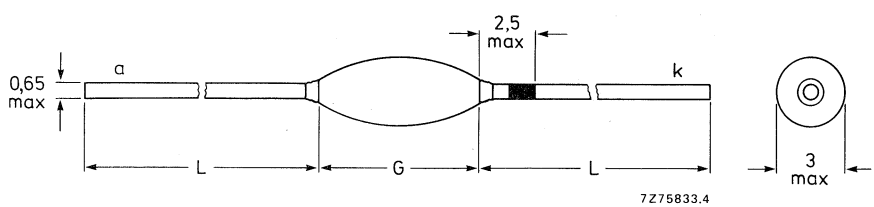
QUICK REFERENCE DATA

			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		^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 = 29,5 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.

*See also "Custom made E.H.T. stacks" in section "General".

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

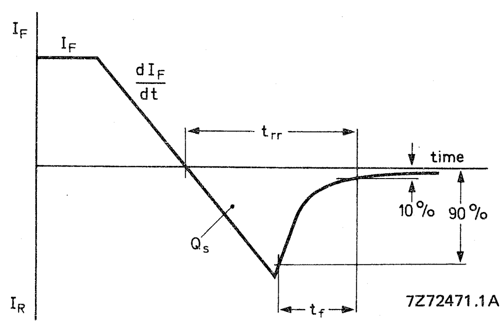


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

▲ 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.

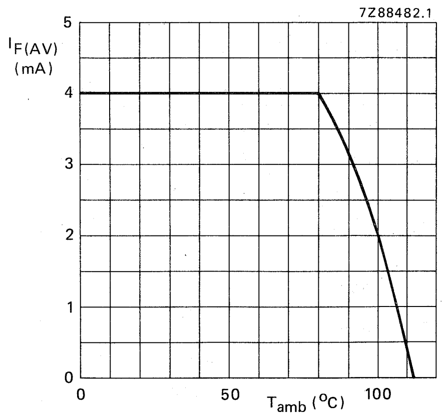


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leqslant 120$ K/W.

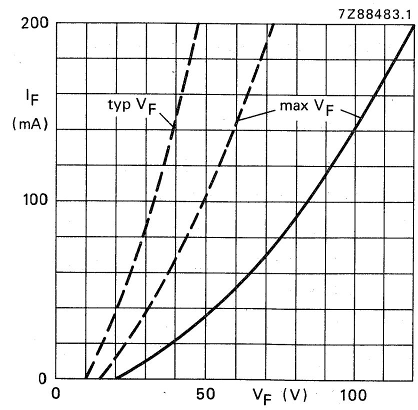


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

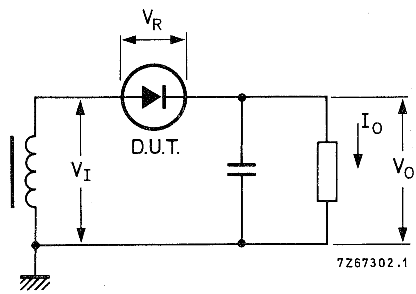


Fig. 5 Typical operation circuit.

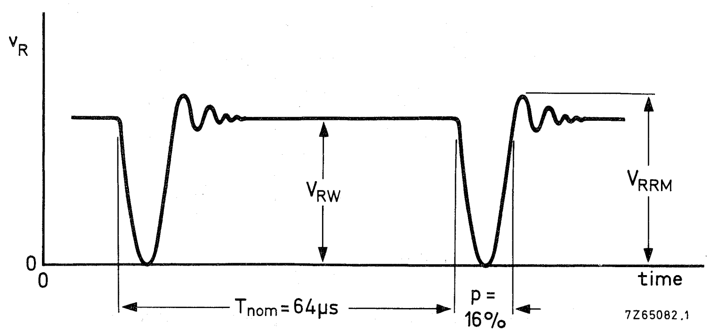


Fig. 6 Typical applied voltage.

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

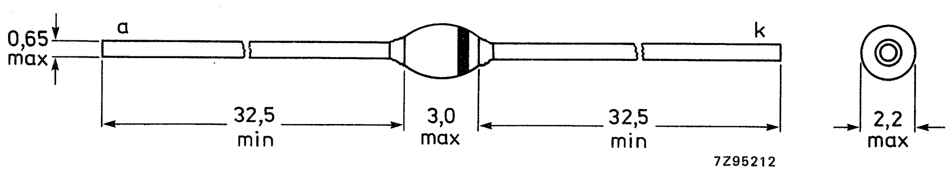
Working reverse voltage	V_{RW}	max.	2000	V
Repetitive peak reverse voltage	V_{RRM}	max.	2200	V
Average forward current	$I_{F(AV)}$	max.	50	mA
Repetitive peak forward current	I_{FRM}	max.	500	mA
Junction temperature	T_j	max.	150	°C
Reverse recovery time	t_{rr}	$<$	300	ns

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 °C	$I_{F(AV)}$	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	°C
Junction temperature	T_j	max.	150 °C

THERMAL RESISTANCE

From junction to ambient	$R_{th\,j\text{-}a}$	=	155 K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage*			
I_F = 50 mA; T_j = 150 °C	V_F	<	6 V
I_F = 200 mA	V_F	<	20 V
I_F = 200 mA; T_j = 150 °C	V_F	<	12 V
Reverse current**			
V_R = 2000 V	I_R	typ.	5 nA
		<	10 nA
V_R = 2000 V; T_j = 120 °C	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 = 100V	C_d	<	0,8 pF

* Measured under pulsed conditions to avoid excessive dissipation.

** Illumination $\leqslant$ 300 lux; relative humidity $\leqslant$ 65%.

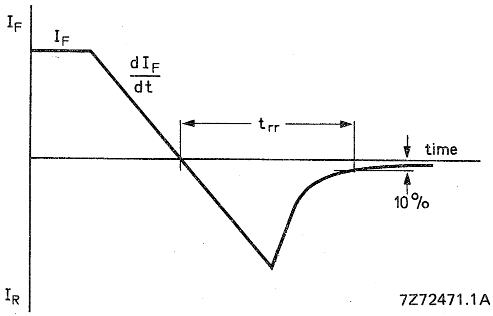


Fig. 2 Definition of t_{rr}.

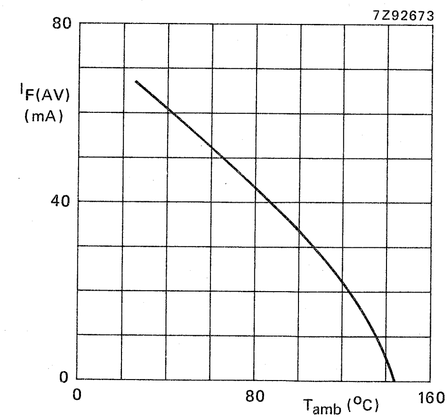


Fig. 3 Maximum permissible average forward current vs. ambient temperature; a = 1,57.

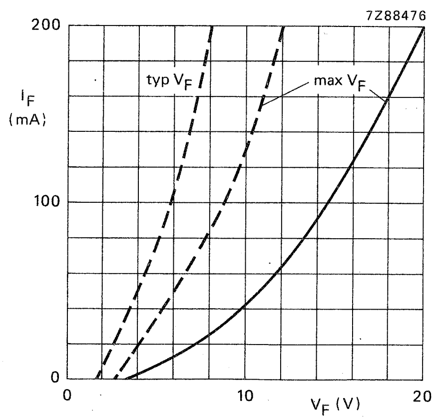


Fig. 4 Forward current vs. forward voltage
——— T_j = 25 °C; – – – – T_j = 150 °C.

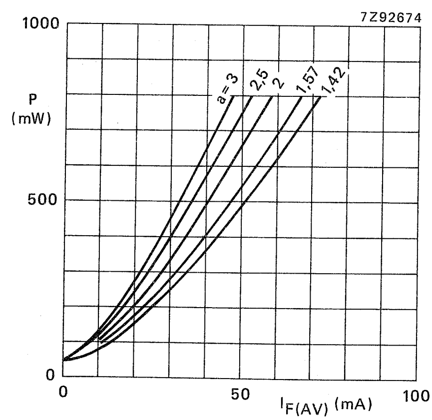


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses vs. average forward current; a = $I_{F(RMS)}/I_{F(AV)}$.

Conditions for Figs 3 and 5:
switched-mode application; $V_R = V_{RWmax}$; δ = 0,5.

EHT avalanche very fast soft-recovery diodes

BY617

FEATURES

- Soft-recovery (non snap-off) characteristics
- Capable of absorbing avalanche energy e.g. during flashover in picture tubes
- Low reverse switching losses.

DESCRIPTION

EHT rectifier diodes in hermetically-sealed, axially-leaded glass envelope and designed for colour TV and monitor applications with frequencies up to 128 kHz. They are suitable for use in high voltage applications such as multipliers and especially in layer-wound diode-split-transformers where controlled avalanche energy capabilities are required.

Because of the small envelope, the diode should be used in a suitable insulating medium (resin, oil or SF6 gas).

QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYP.	MAX.	UNIT
V_{RW}	reverse working voltage	–	7.5	kV
V_{RRM}	repetitive peak reverse voltage	–	9	kV
$I_{F(AV)}$	average forward current	–	4	mA
Q_s	reverse recovery charge	–	0.4	nC
t_{rr}	reverse recovery time	100	–	ns
T_j	junction temperature	–	120	°C

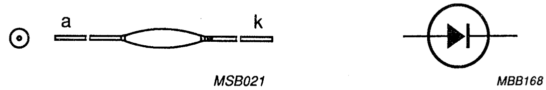


Fig.1 Simplified outline (SOD61) and symbol.

EHT avalanche very fast soft-recovery diodes

BY617

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134)

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RW}	reverse working voltage		–	7.5	kV
V_{RRM}	repetitive peak reverse voltage	note 1	–	9	kV
$I_{F(AV)}$	average forward current	averaged over any 20 ms period	–	4	mA
I_{FRM}	repetitive peak forward current		–	500	mA
T_{stg}	storage temperature range		–65	120	°C
T_j	junction temperature		–	120	°C

Note

1. Capable of withstanding the avalanche energy, e.g. during flashover in a picture tube.

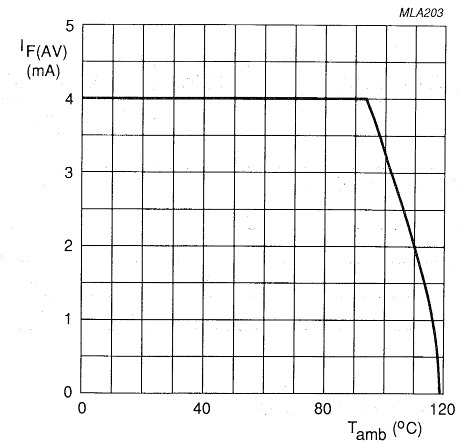
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 100 mA; T_j = 120 °C; note 1	–	–	37.5	V
I_R	reverse current	$V_R = V_{RW}$; T_j = 120 °C	–	–	3	µA
Q_s	reverse recovery charge	when switched from I_F = 100 mA to V_R > 100 V with $-dI_F/dt$ = 200 mA/µs see Fig.5	–	–	0.4	nC
t_{rr}	reverse recovery time	when switched from I_F = 100 mA to V_R > 100 V with $-dI_F/dt$ = 200 mA/µs; I_R = 1 mA see Fig.5	–	100	–	ns
t_f	fall time	when switched from I_F = 100 mA to V_R > 100 V with $-dI_F/dt$ = 200 mA/µs; I_R = 1 mA see Fig.5	40	–	–	ns

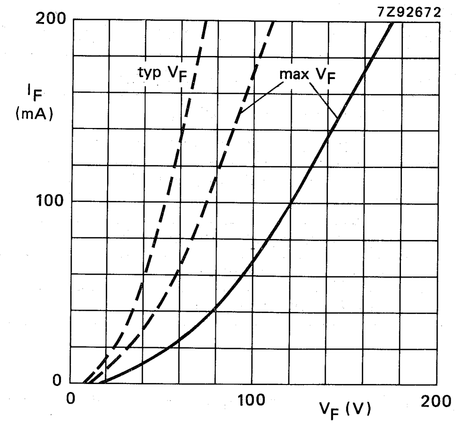
Note

1. Measured under pulse conditions to avoid excessive dissipation.



Diode to be mounted such that $R_{th\ j\text{-}a}$ < 120 K/W.

Fig.2 Maximum permissible average forward current as a function of ambient temperature; the current includes losses due to reverse leakage.



Solid line: T_j = 25 °C.

Dotted line; T_j = 120 °C.

Fig.3 Forward current as a function of forward voltage.

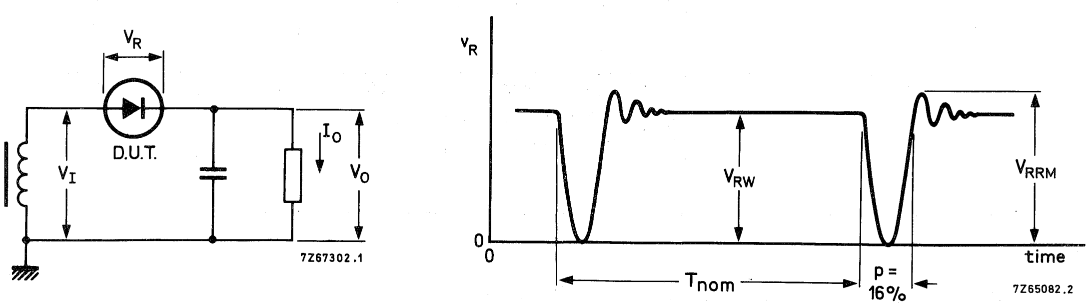


Fig.4 Typical operation circuit and voltage waveform.

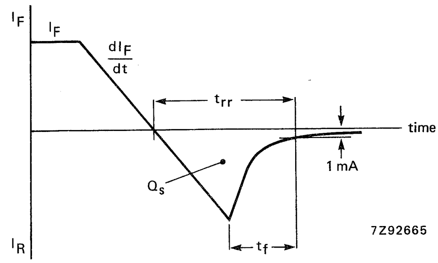
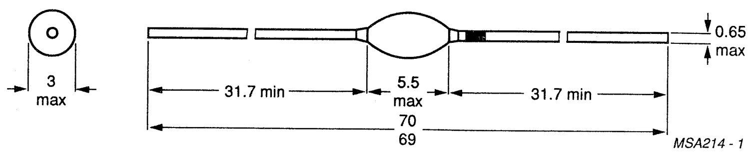


Fig.5 Definitions of Q_s, t_{rr} and t_f.

PACKAGE OUTLINE



Dimensions in mm.

The cathode is indicated by a blue band on the lead.

Fig.6 SOD61.

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

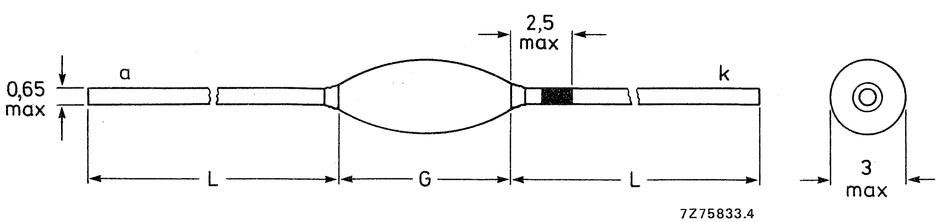
			BY619	BY620	
Working reverse voltage	V_{RW}	max.	12	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	15	17	kV
Average forward current	$I_{F(AV)}$	max.	4		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	$<$	0,4		nC
Reverse recovery time	t_{rr}	typ.	100		ns

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.

*See also "Custom made E.H.T. stacks" in section "General".

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

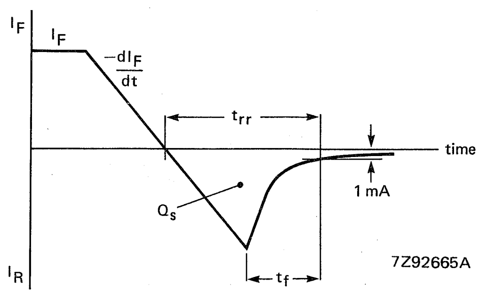


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* 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.

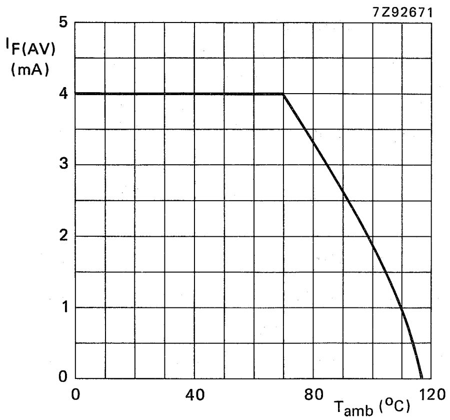


Fig. 3 Maximum permissible average forward current versus ambient temperature; the current includes losses due to reverse leakage. Diode to be mounted such that $R_{th\ j\text{-}a} < 120$ K/W.

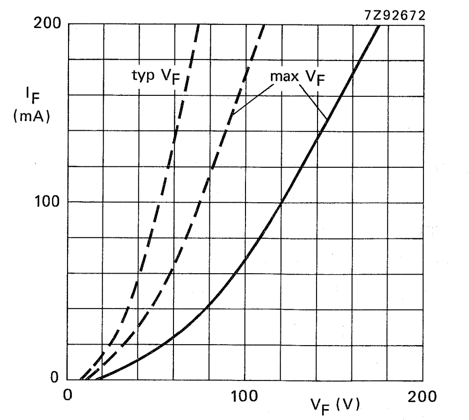


Fig. 4 —— T_j = 25 °C; – – – T_j = 120 °C.

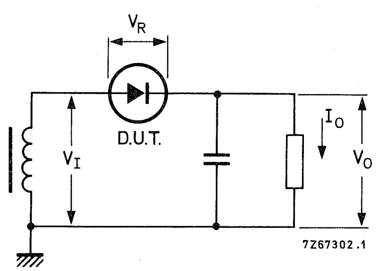


Fig. 5 Typical operation circuit.

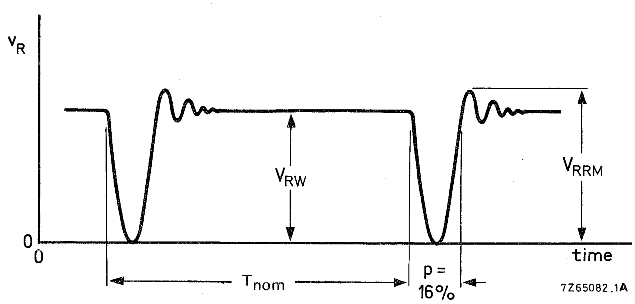


Fig. 6 Typical applied voltage.

CONTROLLED AVALANCHE RECTIFIER DIODES

Glass passivated rectifier diode in hermetically sealed axial-leaded ID* envelope capable of absorbing reverse transients, intended for rectifier applications in colour television circuits as well as general purpose applications in telephony equipment.

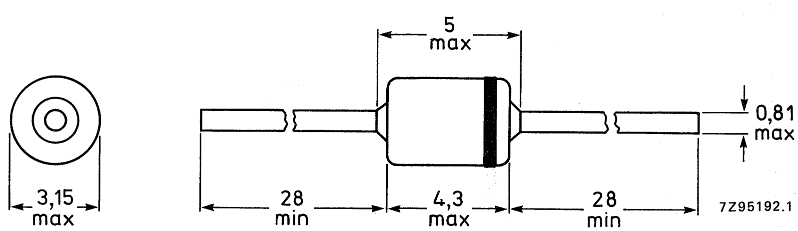
QUICK REFERENCE DATA

Crest working 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 avalanche energy	E_{RSM}	max.	40	mJ
Junction temperature	T_j	max.	175	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-84.



The marking band indicates the cathode.

* Implosion Diode.

RATINGS

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

Crest working voltage	V_{RWM}	max.	800 V
Repetitive peak reverse voltage ($\delta \leqslant 1\%$)	V_{RRM}	max.	1250 V
Continuous reverse voltage	V_R	max.	800 V
Average forward current (averaged over any 20 ms period)			
T_{tp} = 45 °C; lead length 10 mm	$I_{F(AV)}$	max.	2 A
T_{amb} = 60 °C; see Fig. 2	$I_{F(AV)}$	max.	1 A
Repetitive peak forward current T_{tp} = 45 °C; f = 50 Hz; a = 4,5 (inclusive derating for $T_{j\,max}$ at V_{RRM} = 1250 V)	I_{FRM}	max.	20 A
Non-repetitive peak forward current t = 10 ms, half-sine wave (see Fig. 10)	I_{FSM}	max.	50 A
Non-repetitive peak reverse avalanche pulse energy; I_R = 0,8 A; T_j = 25 °C prior to surge; with inductive load switched off	E_{RSM}	max.	40 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	$R_{th\,j\text{-}tp}$	=	50 K/W
2. Thermal resistance from junction to ambient; device mounted on a 1,5 mm thick epoxy-glass printed-circuit board; Cu-thickness ⩾ 40 μm; Fig. 2 (See "Thermal model")	$R_{th\,j\text{-}a}$	=	105 K/W

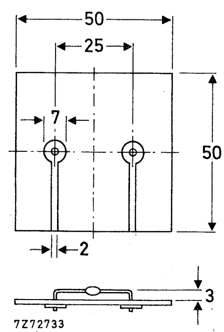


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage*			
I_F = 3 A	V_F	<	1,15 V
I_F = 3 A; $T_j = T_{j\,max}$		<	1,05 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		<	10 μA
Reverse recovery when switched from I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 5 A/μs			
recovery charge	Q_s	typ.	3 μC
recovery time	t_{rr}	typ.	2,5 μs
Diode cpacitance at f = 1 MHz			
V_R = 0	C_d	typ.	50 pF

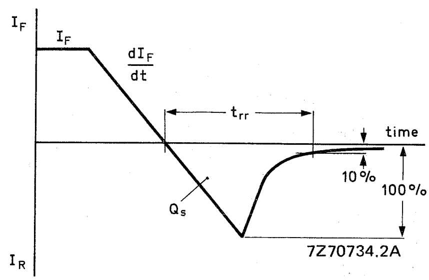


Fig. 3 Definitions of t_{rr}, Q_s and dI_F/dt.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

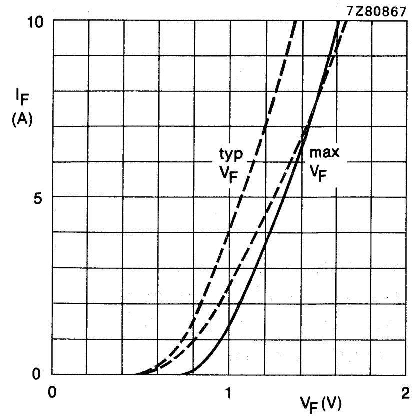


Fig. 4 Forward voltage;
——— T_j = 25 °C;
– – – T_j = 175 °C.

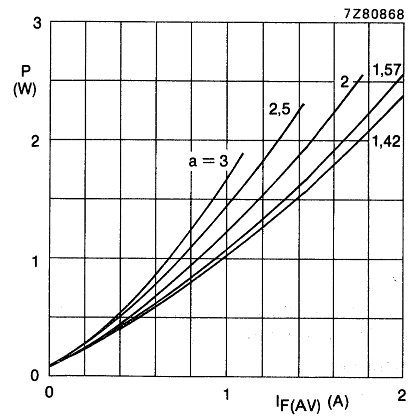


Fig. 5 Maximum values steady state power dissipation (forward plus leakage current) as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWM\,max}$.

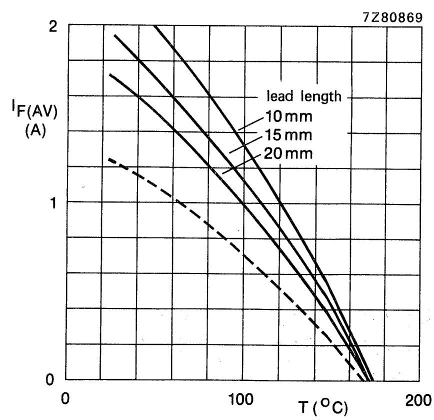


Fig. 6 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWM\,max}$, δ = 0,5; a = 1,57.

– – – = ambient temperature and device mounted as shown in Fig. 2.

——— = tie-point temperature.

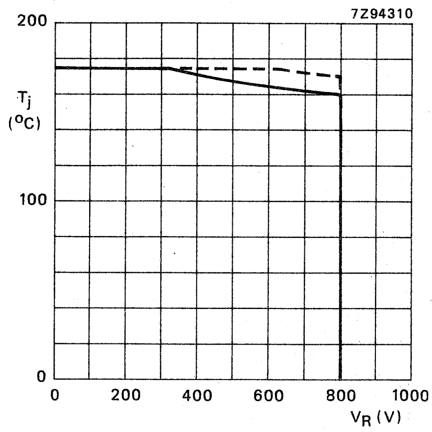


Fig. 7 Maximum permissible junction temperature as a function of reverse voltage; —— = V_R; – – – = V_{RWM}; δ = 0,5.
Device mounted as shown in Fig. 2.

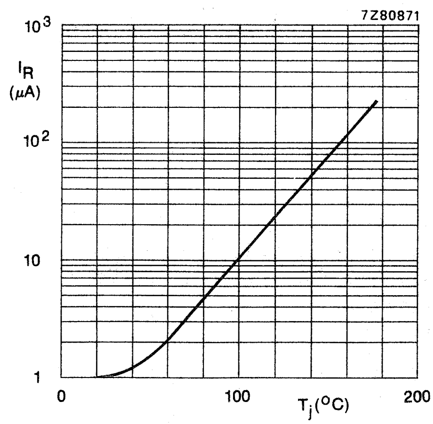


Fig. 8 Maximum values reverse current as a function of junction temperature; $V_R = V_{RWM\,max}$.

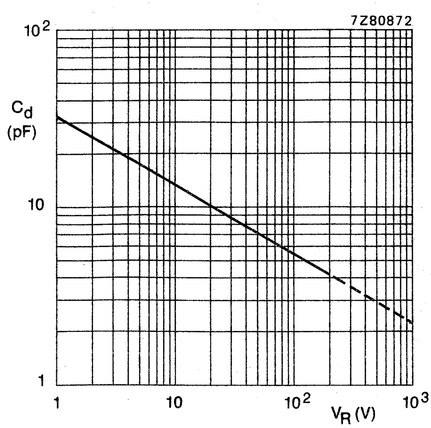


Fig. 9 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

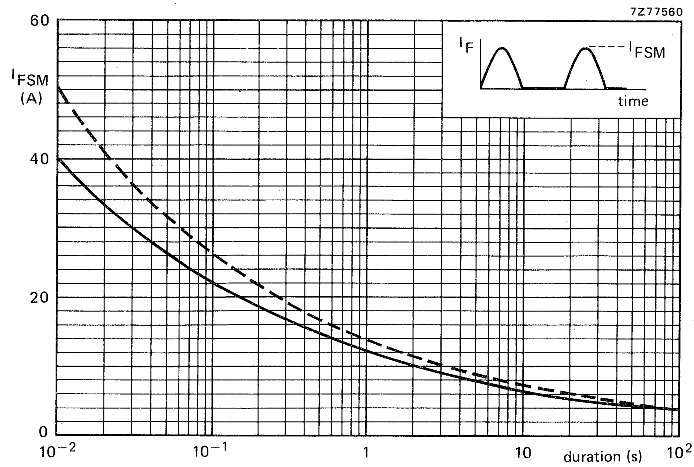
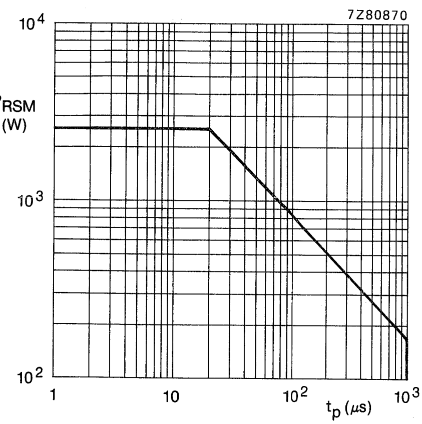


Fig. 10 Maximum permissible non-repetitive peak forward current based on sinusoidal currents; f = 50 Hz.

– – – T_j = 25 °C prior to surge; V_R = 0.

—— $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWM\,max}$.



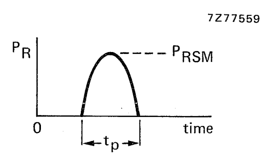


Fig. 11 Non-repetitive peak reverse power in the avalanche region; T_j = 25 °C prior to surge; typical values.

SILICON EHT SOFT-RECOVERY RECTIFIER DIODES

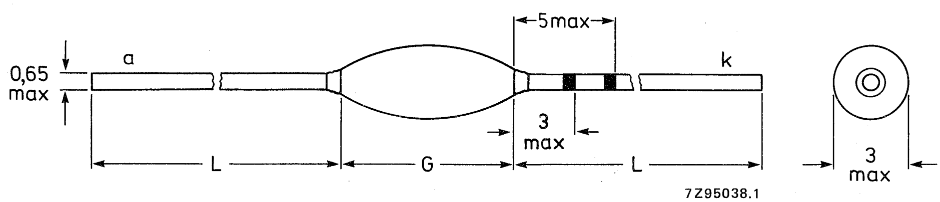
EHT rectifier diodes in glass envelopes intended for use in general purpose high-voltage applications. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test cases).

QUICK REFERENCE DATA

			BY705	BY706	
Working reverse voltage	V_{RW}	max.	4.0	5.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	5.0	6.0	kV
Average forward current	$I_{F(AV)}$	max.	20		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	<	1.0		nC
Reverse recovery time	t_{rr}	typ.	0.2		μs

MECHANICAL DATA

Dimensions in mm



L = 28 min.
G = 5.5 max.

The BY705 cathode is indicated by two brown bands on the lead.
The BY706 cathode is indicated by a brown band on the lead.

Fig. 1 SOD-61.

RATINGS

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

			BY705	BY706	
Working reverse voltage	V_{RW}	max.	4.0	5.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	5.0	6.0	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	5.0	6.0	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	20		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	<	21	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3.0	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	<	1.0	nC
recovery time at $I_R = 1$ mA	t_{rr}	typ.	0.2	μs
fall time at $I_R = 1$ mA	t_f	>	0.1	μs

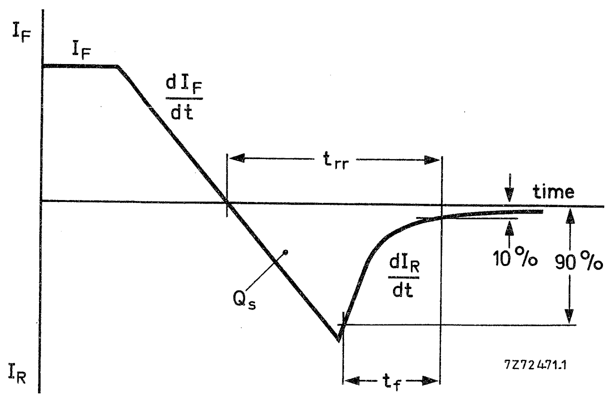


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

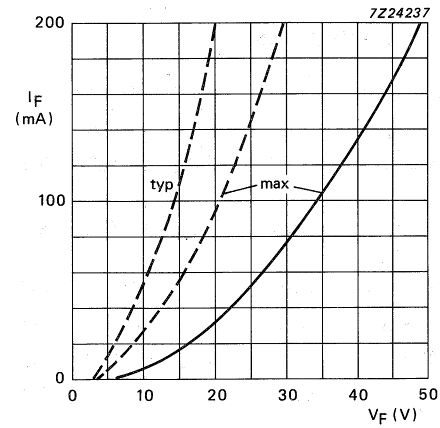


Fig. 3 Max. forward voltage;
—— = T_j = 25 °C
– – – = T_j = 120 °C

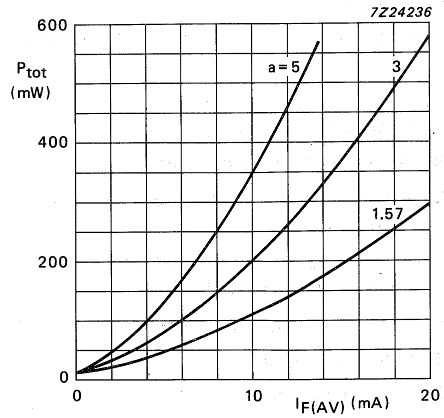


Fig. 4 Total power dissipation (forward leakage current) as a function of average forward current; a = I_F(rms)/$_F$(av); V_R = V_{RWmax}.

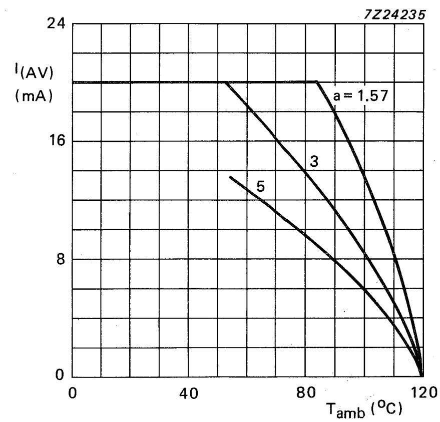


Fig. 5 Maximum average forward current as a function of ambient temperature; a = I_F(rms)/I_F(av).
(The diode should be mounted in such a way that $R_{th\,j\text{-}a} \leqslant 120$ K/W)

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).

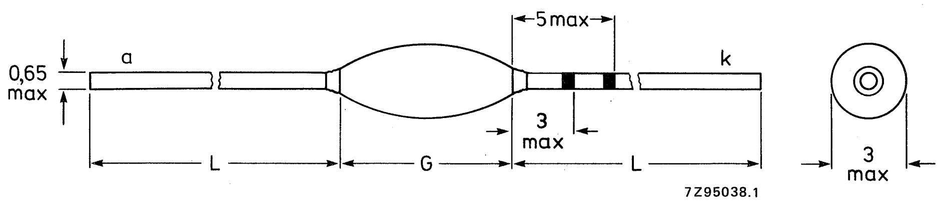
QUICK REFERENCE DATA

			BY707	708	709	
Working reverse voltage	V_{RW}	max.	9	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	10	12	14	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 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.

*See also "Custom made E.H.T. stacks" in section "General".

RATINGS

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

			BY707	708	709	
Working reverse voltage	V_{RW}	max.	9	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	10	12	14	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	10	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 $V_R \geqslant 100$ 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

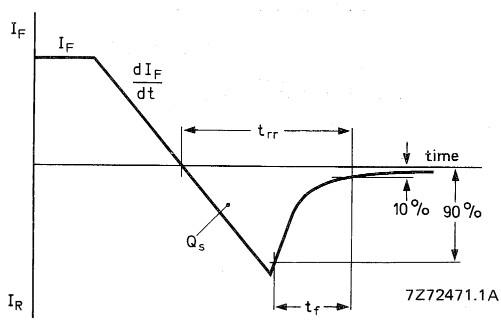


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occuring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

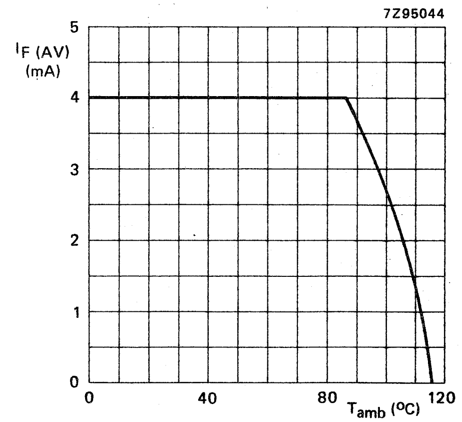


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leqslant 120$ K/W.

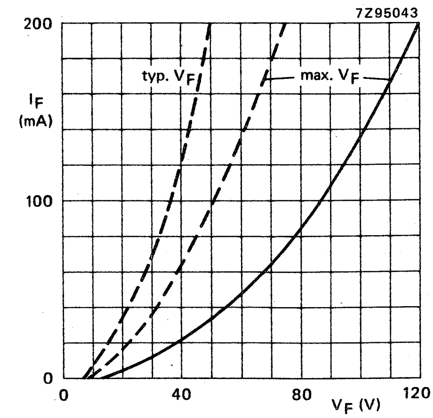


Fig. 4 ——— $T_j = 25$ °C; – – – – $T_j = 120$ °C.

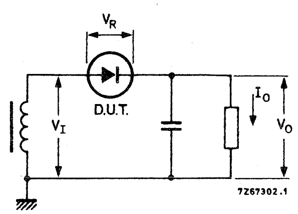


Fig. 5 Typical operation circuit.

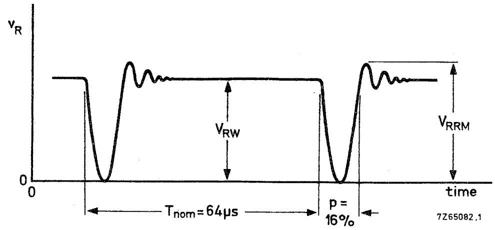


Fig. 6 Typical applied voltage.

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).

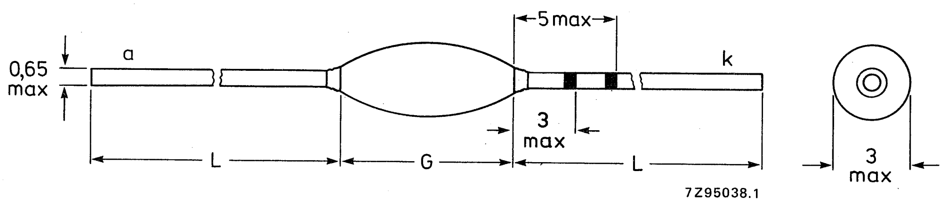
QUICK REFERENCE DATA

			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		^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 = 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.

*See also "Custom made E.H.T. stacks" in section "General".

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

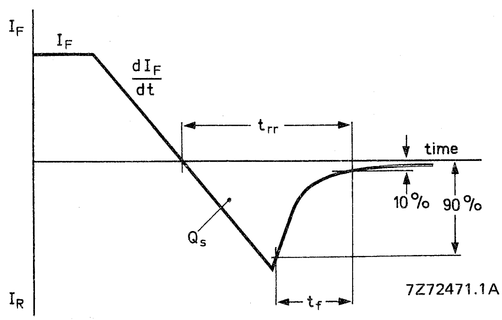


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occurring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

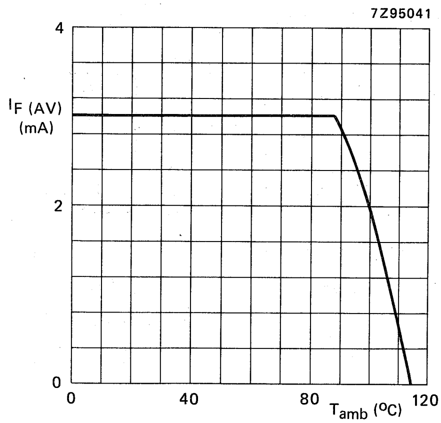


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ K/W.

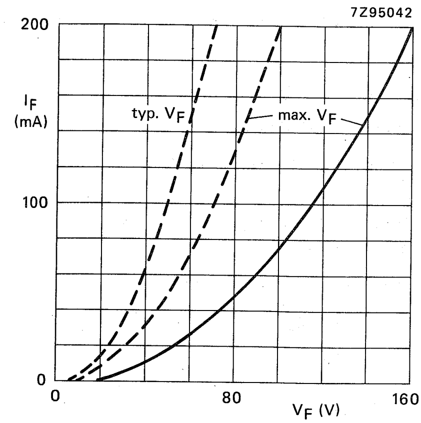


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

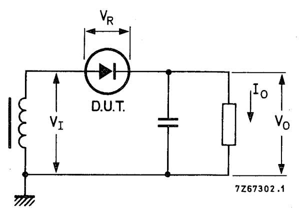


Fig. 5 Typical operation circuit.

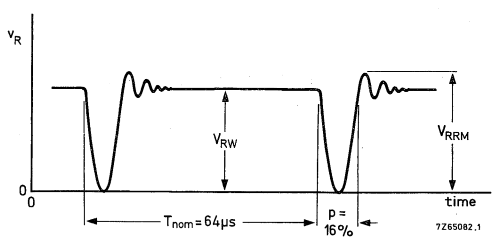


Fig. 6 Typical applied voltage.

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).

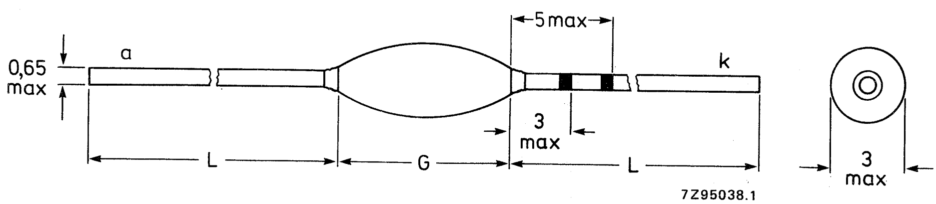
QUICK REFERENCE DATA

			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.

*See also "Custom made E.H.T. stacks" in section "General".

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

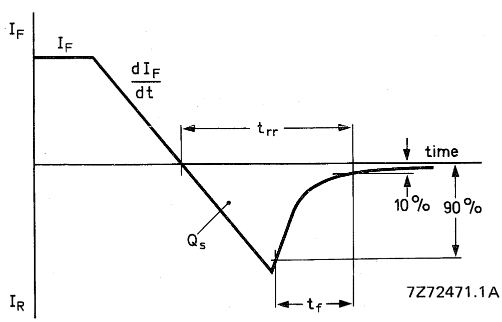


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* The device can withstand peak currents occurring during flashover in a picture tube.
** Measured under pulse conditions to avoid excessive dissipation.

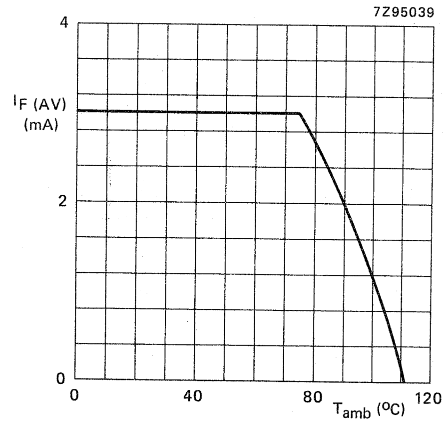


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leqslant 120$ K/W.

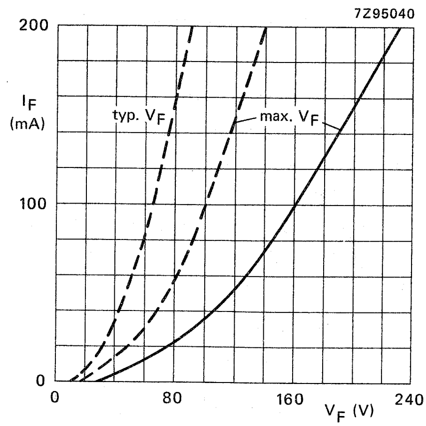


Fig. 4 ——— T_j = 25 °C; – – – – T_j = 120 °C.

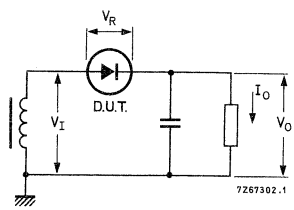


Fig. 5 Typical operation circuit.

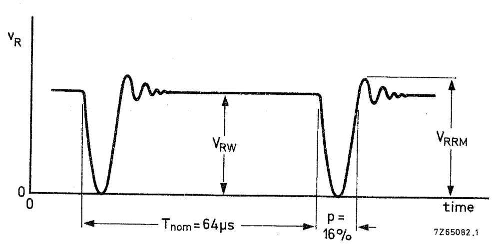


Fig. 6 Typical applied voltage.

SILICON VERY FAST EHT SOFT-RECOVERY RECTIFIER DIODES

EHT rectifier diodes in glass envelopes intended for use in general purpose high-speed high-voltage applications. 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

			BY715	BY716	
Working reverse voltage	V_{RW}	max.	4.0	5.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	5.0	6.0	kV
Average forward current	$I_{F(AV)}$	max.	20		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	$<$	0.4		nC
Reverse recovery time	t_{rr}	typ.	100		ns

MECHANICAL DATA

Dimensions in mm

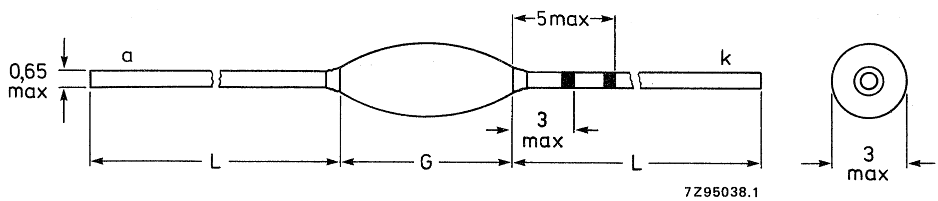


Fig. 1 SOD-61.

L = 28 min.
G = 5.5 max.

The BY715 cathode is indicated by a brown band (inner) and a green band (outer) on the lead.
The BY716 cathode is indicated by a brown band (inner) and a red band (outer) on the lead.

RATINGS

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

			BY715	BY716	
Working reverse voltage	V_{RW}	max.	4.0	5.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	5.0	6.0	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	5.0	6.0	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	20		mA
Repetitive peak forward current	I_{FRM}	max.	500		mA
Storage temperature range	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	<	28	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3.0	µA
Reverse recovery when switched from $I_F = 100$ mA to $V_R \geq 100$ V; $-dI_F/dt = 200$ mA/µs; $T_j = 25$ °C				
recovery charge	Q_s	<	0.4	nC
recovery time	t_{rr}	typ.	100	ns
fall time	t_f	>	0.04	µs

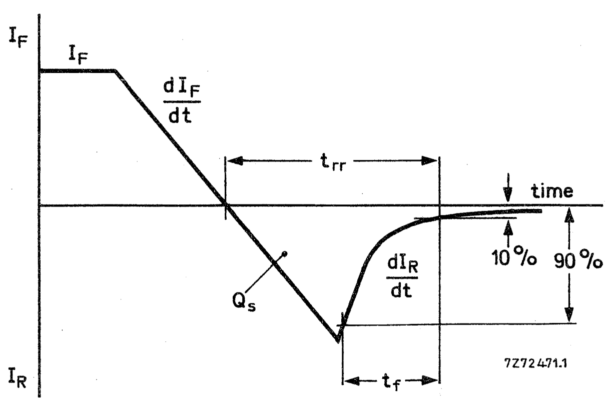


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

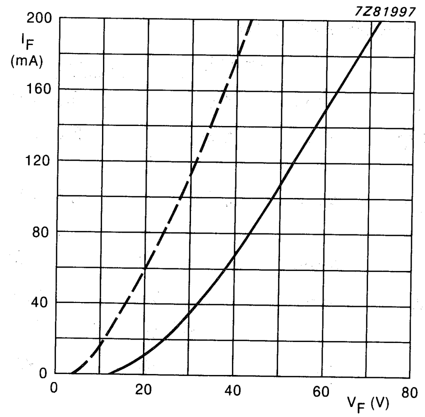


Fig. 3 Maximum forward voltage drop.
——— = T_j 25 °C;
– – – – = T_j max.

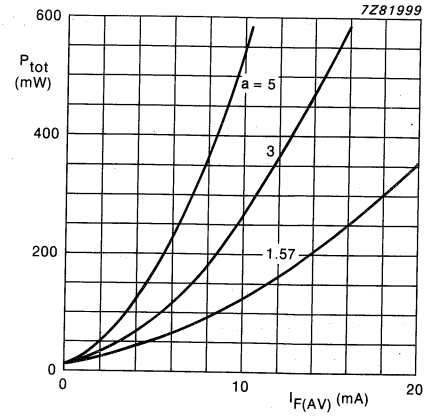


Fig. 4 Maximum steady state power dissipation (forward plus leakage current)
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = R_{RWmax}$.

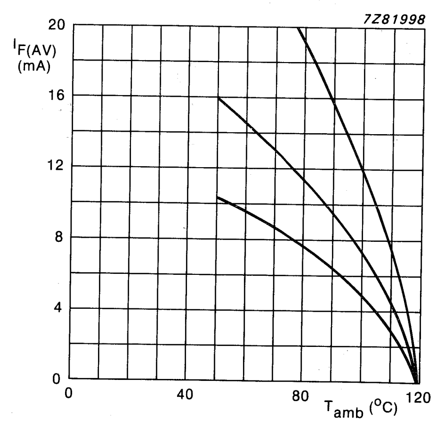


Fig. 5 Maximum average forward current as a function of ambient temperature; the curves include losses due to reverse leakage current.
Devices should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ K/W.

SILICON VERY FAST EHT SOFT-RECOVERY RECTIFIER DIODES

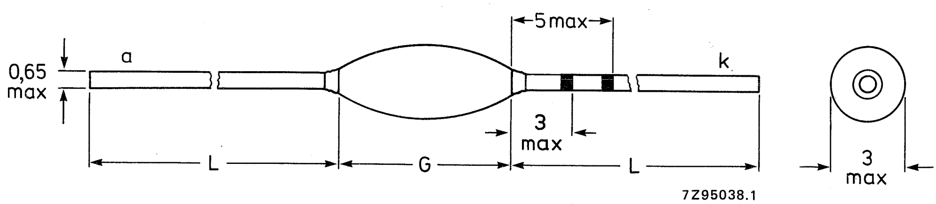
EHT rectifier diodes in glass envelopes intended for use in high-voltage applications e.g. the high-voltage supply of television receivers and monitors, at frequencies in excess of 30 kHz. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test cases).

QUICK REFERENCE DATA

			BY717	718	719	
Working reverse voltage	V_{RW}	max.	9.0	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	10	12	14	kV
Average forward current	$I_{F(AV)}$	max.		4.0		mA
Junction temperature	T_j	max.		120		°C
Reverse recovery charge	Q_s	<		0.4		nC
Reverse recovery time	t_{rr}	typ.		0.1		μs

MECHANICAL DATA

Dimensions in mm



L = 29 min.
G = 9.5 max.

The BY717 cathode is indicated by a red band (inner) and a green band (outer) on the lead.
The BY718 cathode is indicated by a red band (inner) and a blue band (outer) on the lead.
The BY719 cathode is indicated by a red band (inner) and a curry yellow band (outer) on the lead.

* See also "Custom made EHT stacks" in section "General".

Fig. 1 SOD-61.

RATINGS

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

			BY717	718	719	
Working reverse voltage	V_{RW}	max.	9.0	10	12	kV
Repetitive peak reverse voltage	V_{RRM}	max.	10	12	14	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	10	12	14	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.		4.0		mA
Repetitive peak forward current	I_{FRM}	max.		500		mA
Storage temperature range	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	<	69	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3.0	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	<	0.4	nC
recovery time	t_{rr}	typ.	0.1	µs
fall time	t_f	>	0.04	µs

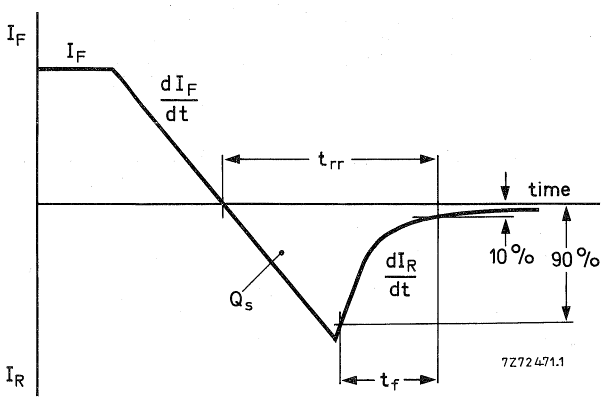


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

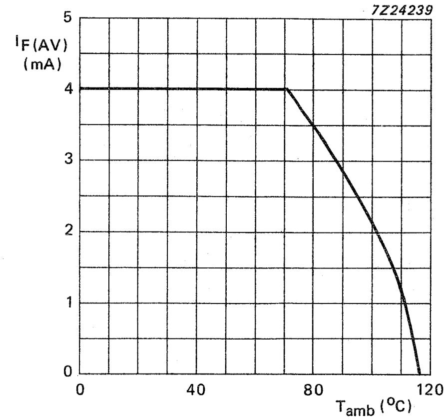


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leq 120$ K/W.

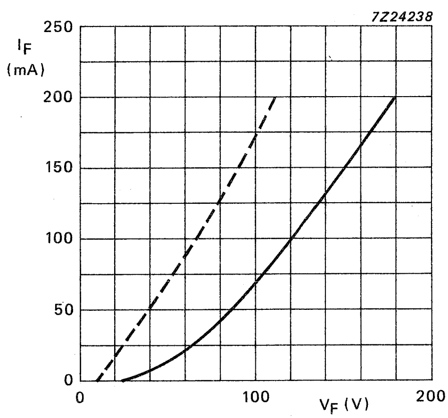


Fig. 4 Max. forward voltage drop; —— = T_j = 25 °C; ---- = T_j = 120 °C.

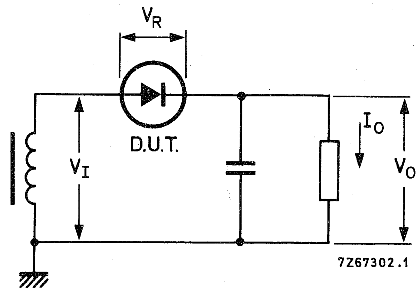


Fig. 5 Typical operation circuit.

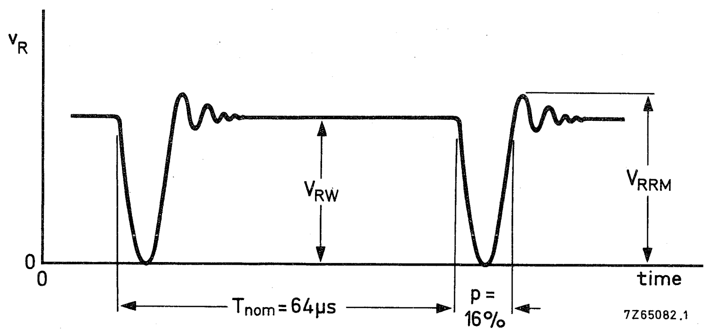


Fig. 6 Typical applied voltage waveform.

SILICON VERY FAST EHT SOFT-RECOVERY RECTIFIER DIODES*

EHT rectifier diodes in glass envelopes intended for use in high voltage applications such as the high voltage supply of television receivers and monitors at frequencies in excess of 30 kHz. 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

			BY720	BY721	
Working reverse voltage	V_{RW}	max.	14.0	16.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	17.0	19.0	kV
Average forward current	$I_{F(AV)}$	max.	3		mA
Junction temperature	T_j	max.	120		°C
Reverse recovery charge	Q_s	<	0.4		nC
Reverse recovery time	t_{rr}	typ.	100		ns

MECHANICAL DATA

Dimensions in mm

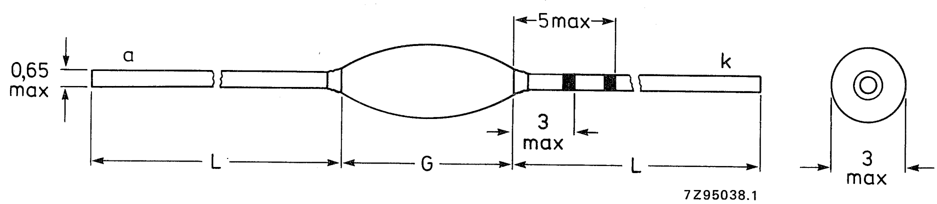


Fig. 1 SOD-61.

L = 28 min.
G = 11 max.

The BY720 cathode is indicated by a green band (inner) and a red band (outer) on the lead.
The BY721 cathode is indicated by a green band (inner) and a blue band (outer) on the lead.

* See also "Custom made EHT stacks" in section "General".

RATINGS

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

			BY720	BY721	
Working reverse voltage	V_{RW}	max.	14.0	16.0	kV
Repetitive peak reverse voltage	V_{RRM}	max.	17.0	19.0	kV
Non-repetitive peak reverse voltage $t < 10$ ms	V_{RSM}	max.	17.0	19.0	kV
Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	3		mA
Repetitive peak forward current	I_{FRM}	max.	400		mA
Storage temperature range	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	<	92	V
Reverse current $V_R = V_{RW}$; $T_j = 120$ °C	I_R	<	3.0	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	<	0.4	nC
recovery time	t_{rr}	typ.	100	ns
fall time	t_f	>	0.04	μs

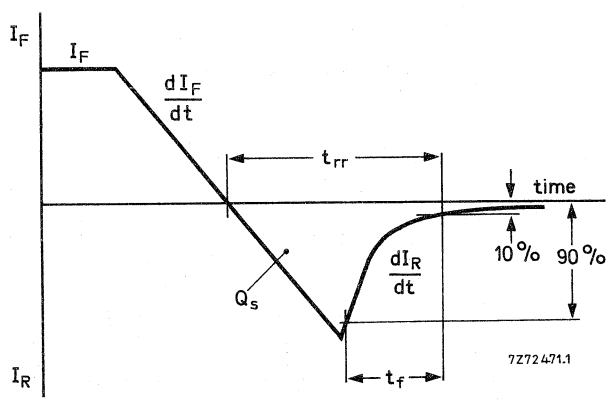


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

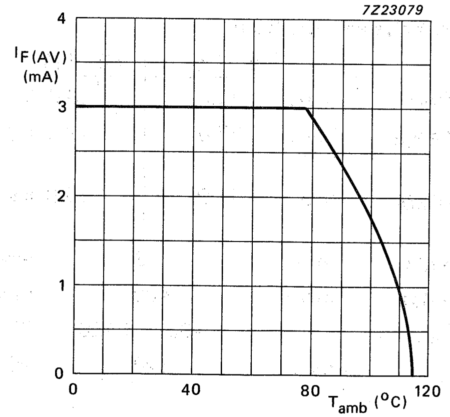


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\ j\text{-}a} \leqslant 120$ K/W.

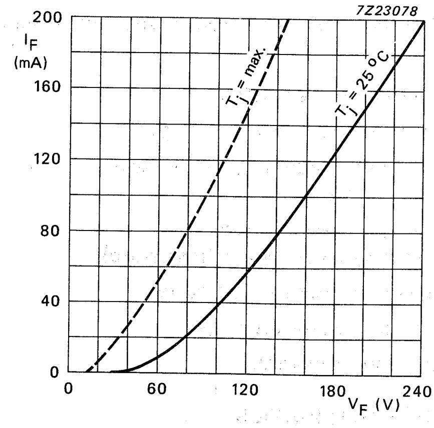


Fig. 4 Forward voltage drop.
——— T_j = 25 °C
– – – T_j = 120 °C.

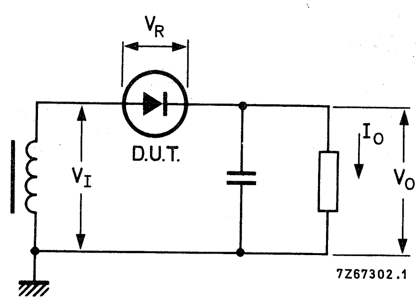


Fig. 5 Typical operation circuit.

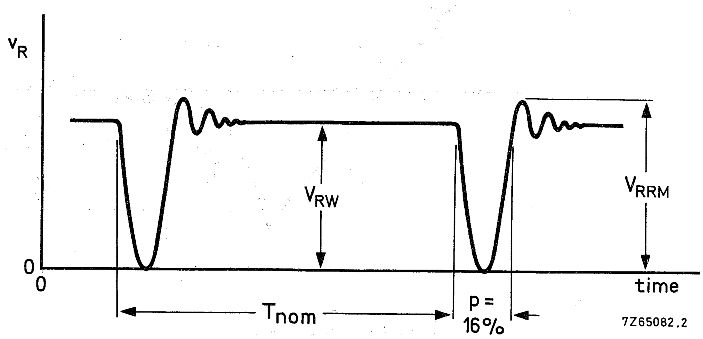


Fig. 6 Typical applied voltage.

SILICON VERY FAST EHT SOFT-RECOVERY RECTIFIER DIODES*

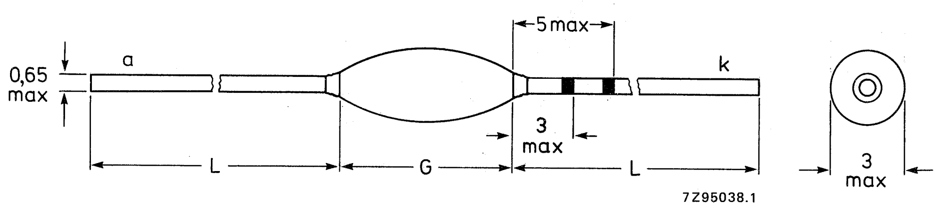
EHT rectifier diodes in glass envelopes intended for use in high-voltage applications e.g. the high-voltage supply of television receivers and monitors, at frequencies in excess of 30 kHz. The devices feature non-snap-off characteristics. Because of the small envelope, the diodes should be used in a suitable insulating medium (resin, oil or special arrangements in test cases).

QUICK REFERENCE DATA

			BY722	723	724	
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.		3.0		mA
Junction temperature	T_j	max.		120		°C
Reverse recovery charge	Q_s	max.		0.4		nC
Reverse recovery time	t_{rr}	typ.		0.1		μs

MECHANICAL DATA

Dimensions in mm



L = 27 min.
G = 12.5 max.

Fig. 1 SOD-61.

The BY722 cathode is indicated by a blue band (inner) and a red band (outer) on the lead.
The BY723 cathode is indicated by a blue band (inner) and a green band (outer) on the lead.
The BY724 cathode is indicated by a blue band (inner) and a curry yellow band (outer) on the lead.

* See also "Custom made EHT stacks" in section "General".

RATINGS

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

			BY722	723	724	
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.		3.0		mA
Repetitive peak forward current	I_{FRM}	max.		300		mA
Storage temperature range	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 = 50 mA; T_j = 120 °C	V_F	max.	88	V
Reverse current $V_R = V_{RW}$; T_j = 120 °C	I_R	max.	3.0	μA
Reverse recovery when switched from I_F = 100 mA to $V_R \geq 100$ V; $-dI_F/dt$ = 200 mA/μs; T_j = 25 °C				
recovery charge	Q_s	max.	0.4	nC
recovery time	t_{rr}	typ.	0.1	μs
fall time	t_f	min.	0.04	μs

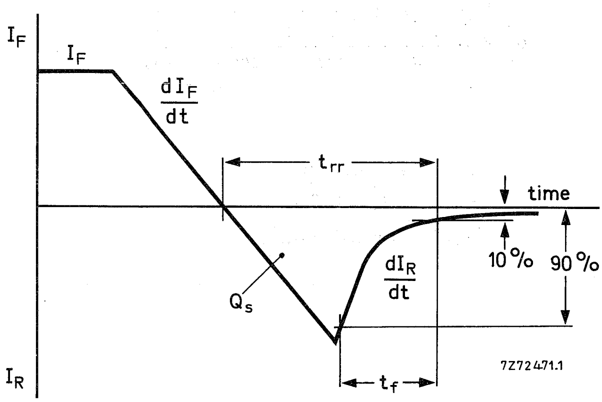


Fig. 2 Definitions of Q_s, t_{rr} and t_f.

* Measured under pulse conditions to avoid excessive dissipation.

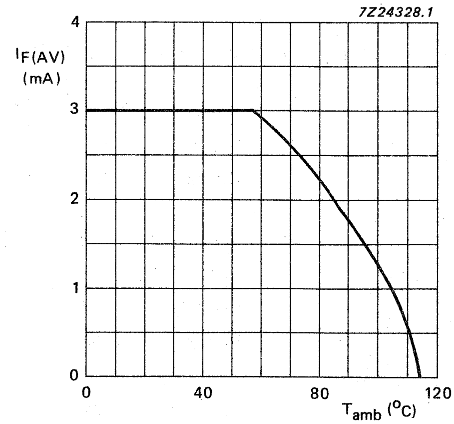
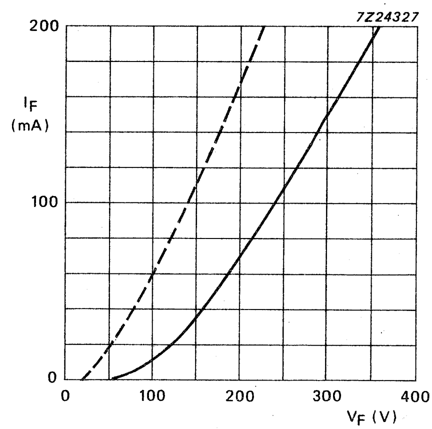


Fig. 3 Maximum permissible average forward current as a function of ambient temperature. $V_R = V_{RWmax}$. The diode should be mounted in such a way that $R_{th\,j\text{-}a} \leq 120$ K/W.



——— = T_j = 25 °C;
– – – = T_j = 120 °C.

Fig. 4 Forward voltage drop.

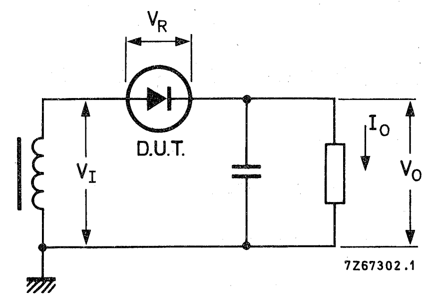


Fig. 5 Typical operation circuit.

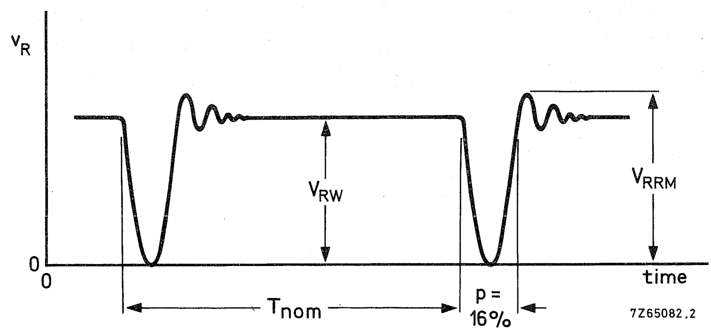


Fig. 6 Typical applied voltage waveform.

CONTROLLED AVALANCHE RECTIFIER DIODES

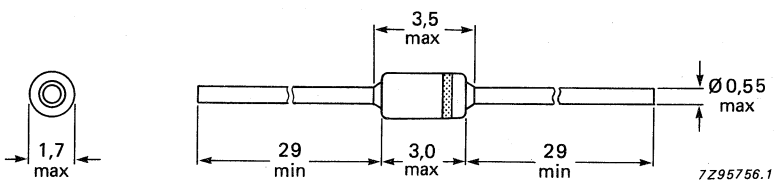
Glass passivated rectifier diodes in hermetically sealed axial-leaded SOD-91 ID* envelope, intended for general purpose rectifier applications.
The devices are capable of absorbing reverse transient energy.

QUICK REFERENCE DATA

			BYD11D	G	J	K	M	
Crest working voltage	V_{RWM}	max.	200	400	600	800	1000	V
Reverse avalanche breakdown breakdown voltage	$V_{(BR)R}$	min.	225	450	650	900	1100	V
		max.	1600	1600	1600	1600	1600	V
Average forward current	$I_{F(AV)}$	max.	0.5	0.5	0.5	0.5	0.5	A
Non-repetitive peak forward current	I_{FSM}	max.	10	10	10	10	10	A
Junction temperature	T_j	max.	175	175	175	175	175	°C

MECHANICAL DATA

Dimensions in mm



The marking band indicates the cathode.

Fig. 1 SOD-91.

* Implosion Diode.

RATINGS

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

			BYD11D	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 (a = 1.57) T_{tp} = 55 °C; leadlength 10 mm;	$I_{F(AV)}$		0.5	0.5	0.5	0.5	0.5	A
T_{amb} = 60 °C; (see Fig.2)	$I_{F(AV)}$		0.37	0.37	0.37	0.37	0.37	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.	10	10	10	10	10	A
Non-repetitive peak reverse power dissipation; t = 20 µs (half-sine wave); $T_j = T_{jmax}$ prior to surge	P_{RSM}	max.	200	200	200	200	200	W
Storage temperature range	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 — $R_{thj\text{-}tp}$ = 180 K/W
2. Thermal resistance from junction to ambient; device mounted on a 1.5 mm thick epoxy-glass pc board; Cu-thickness ≥ 40 µm; Fig. 2 (see "Thermal Model") — $R_{thj\text{-}a}$ = 250 K/W

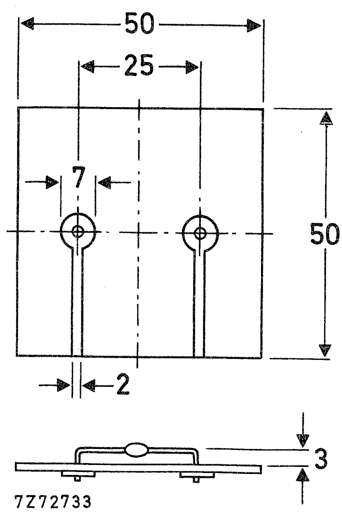


Fig. 2 Device mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD11D	G	J	K	M	
Forward voltage*								
I_F = 0.5 A; T_j = $T_{jmax.}$	V_f	<	0.91	0.91	0.91	0.91	0.91	V
I_F = 0.5 A	V_f	<	1.06	1.06	1.06	1.06	1.06	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	1	1	1	1	μA
V_R = V_{RWMmax}; T_j = 165 °C	I_R	<	75	75	75	75	75	μA
Diode capacitance								
V_R = 0; f = 1 MHz	C_d	typ.	14	14	14	14	14	pF

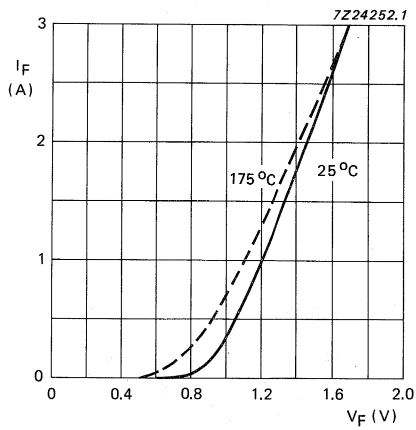


Fig. 3 Maximum forward voltage.

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

CONTROLLED AVALANCHE RECTIFIER DIODES

Glass passivated 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.

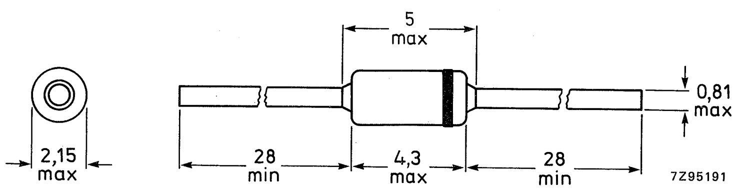
QUICK REFERENCE DATA

			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

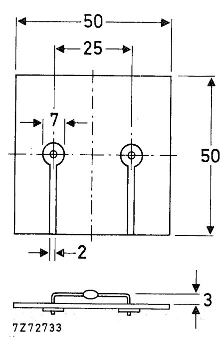


Fig. 2 Device mounted on a printed-circuit board.

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

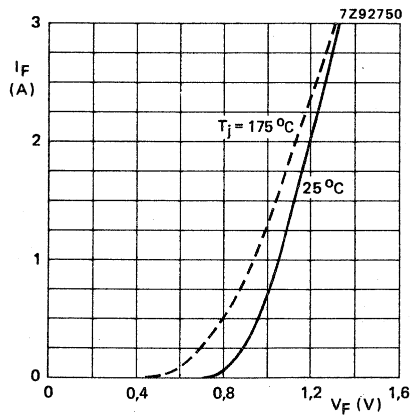


Fig. 3 Maximum forward voltage.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

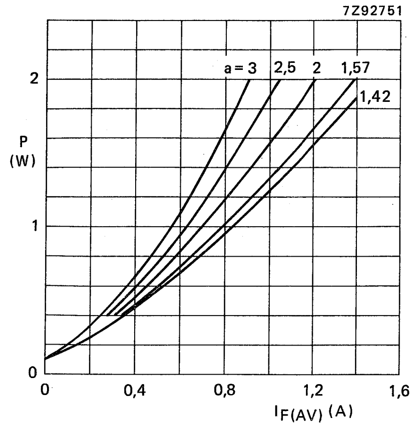


Fig. 4 Maximum values steady state power dissipation (forward plus leakage current) as a function of the average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

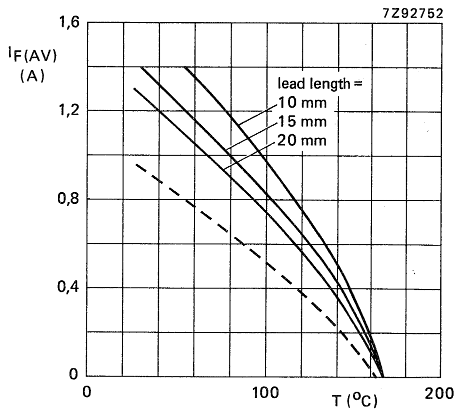


Fig. 5 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$, δ = 0,5; a = 1,57.

---------- = ambient temperature and device mounted as shown in Fig. 2

——— = tie-point temperature

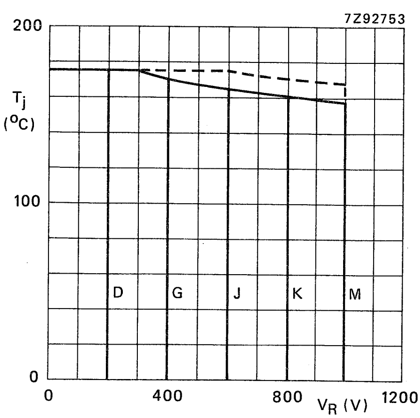


Fig. 6 Maximum permissible junction temperature as a function of reverse voltage;
——— = V_R; -------- = V_{RWM}, δ = 0,5.

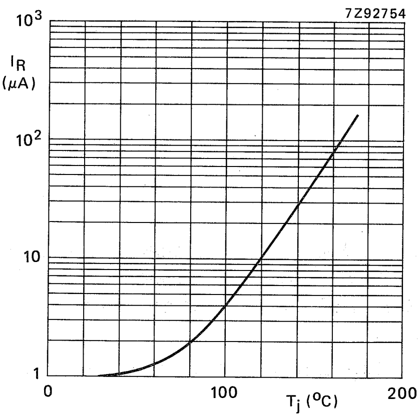


Fig. 7 Maximum values reverse current as a function of junction temperature; $V_R = V_{RWMmax}$.

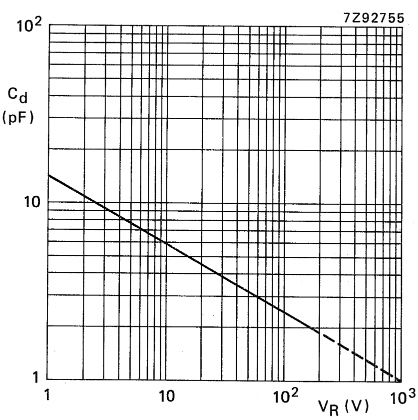
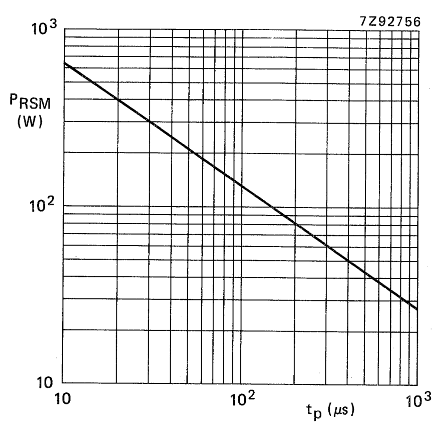


Fig. 8 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.



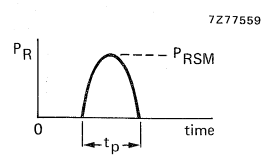


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region; $T_j = T_j$ max.

CONTROLLED AVALANCHE RECTIFIER DIODES

Glass passivated 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.

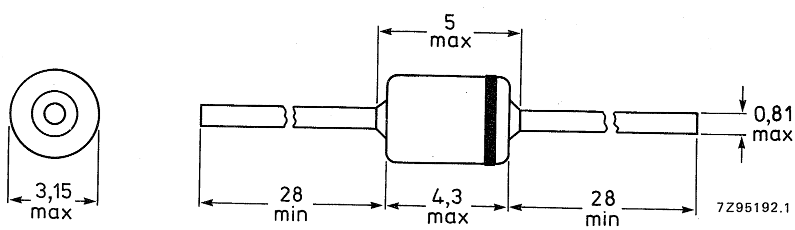
QUICK REFERENCE DATA

			BYD14D	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	
Average forward current	$I_{F(AV)}$	max.			2			A
Non-repetitive peak forward current	I_{FSM}	max.			50			A
Non-repetitive peak reverse avalanche energy	E_{RSM}	max.			40			mJ
Junction temperature	T_j	max.			175			°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-84.



The marking band indicates the cathode.

* Implosion Diode.

RATINGS

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

			BYD14D	G	J	K	M	
Crest working 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} = 45 °C; lead length 10 mm	$I_{F(AV)}$	max.	2	A
T_{amb} = 60 °C; see Fig. 2	$I_{F(AV)}$	max.	1	A
Repetitive peak forward current T_{tp} = 45 °C; f = 50 Hz; a = 4,5 (inclusive derating for T_{jmax} at V_{RRM} = 1000 V)	I_{FRM}	max.	20	A
Non-repetitive peak forward current t = 10 ms, half-sinewave (see Fig. 10)	I_{FSM}	max.	50	A
Non-repetitive peak reverse avalanche energy; I_R = 0,8 A; T_j = 25 °C prior to surge; with inductive load switched off	E_{RSM}	max.	40	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	$R_{th\ j\text{-}tp}$	=	50	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")	$R_{th\ j\text{-}a}$	=	105	K/W

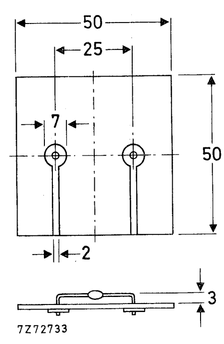


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD14D	G	J	K	M	
Forward voltage*								
I_F = 3 A	V_F	<	1,15	1,15	1,15	1,15	1,15	V
I_F = 3 A; $T_j = T_{jmax}$	V_F	<	1,05	1,05	1,05	1,05	1,05	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
Reverse recovery when switched from I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 5 A/μs								
recovery charge	Q_s	typ.			3			μC
recovery time	t_{rr}	typ.			2,5			μs
Diode capacitance at f = 1 MHz								
V_R = 0	C_d	typ.			50			pF

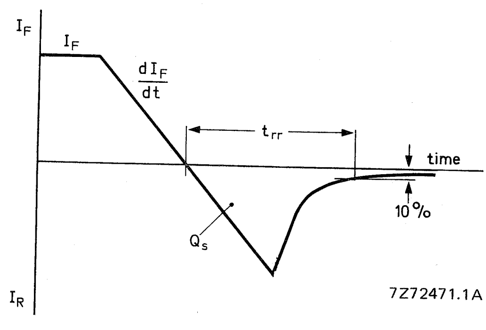


Fig. 3 Definitions of t_{rr}, Q_s and dI_F/dt.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

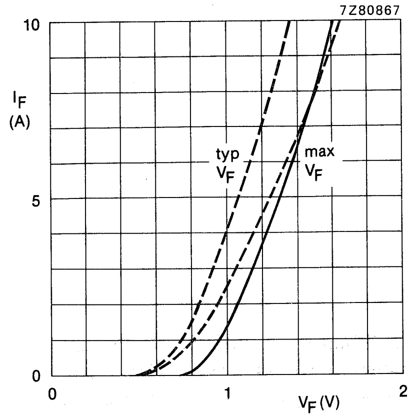


Fig. 4 Forward voltage;
———— T_j = 25 °C; ------------- T_j = 175 °C.

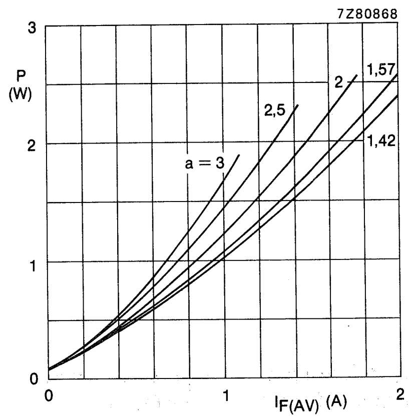


Fig. 5 Maximum values steady state power dissipation (forward plus leakage current) as a function of the average a forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

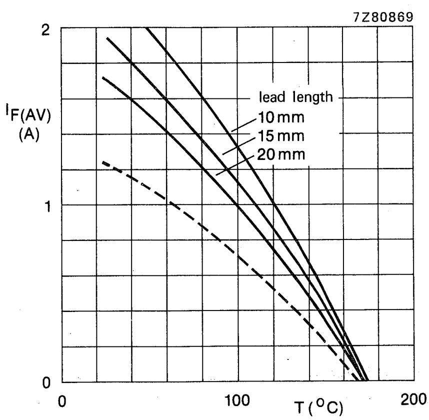


Fig. 6 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$, δ = 0,5; a = 1,57.

------- = ambient temperature and device mounted as shown in Fig. 2

—— = tie-point temperature

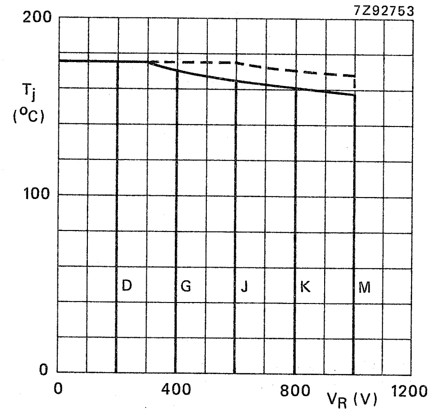


Fig. 7 Maximum permissible junction temperature as a function of reverse voltage; ———— = V_R; ------------ = V_{RWM}, $\delta = 0,5$; device mounted as shown in Fig. 2.

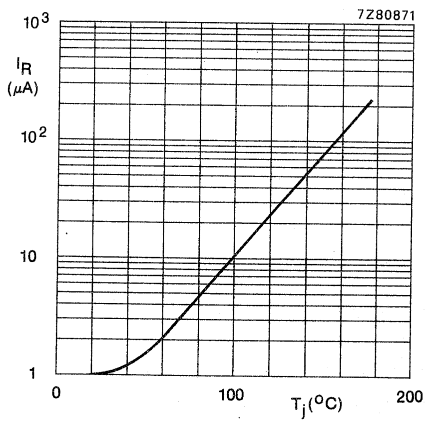


Fig. 8 Maximum values reverse current as a function of junction temperature; $V_R = V_{RWMmax}$.

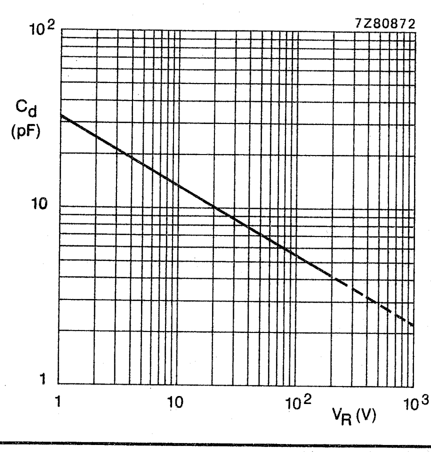


Fig. 9 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

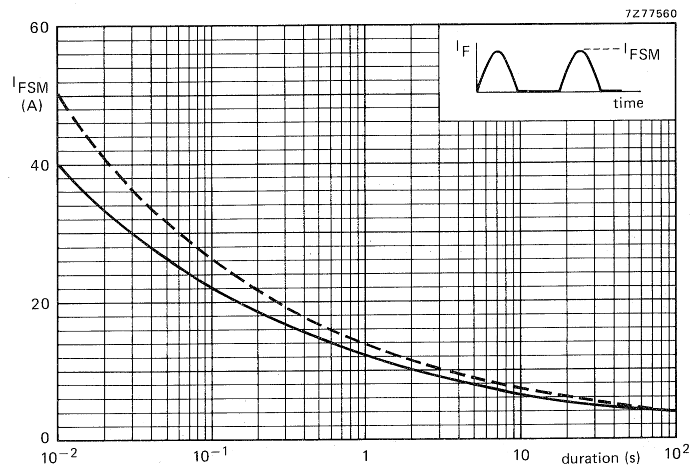
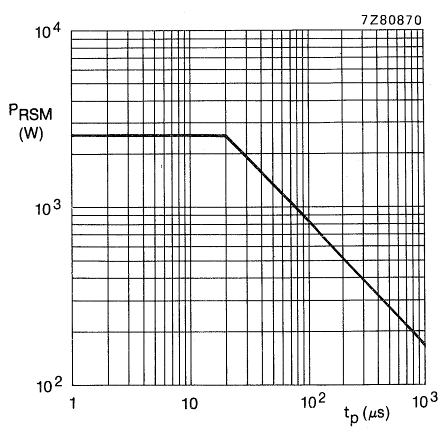


Fig. 10 Maximum permissible non-repetitive peak forward current based on sinusoidal currents; f = 50 Hz.

---------------- T_j = 25 °C prior to surge; V_R = 0

———————— $T_j = T_{j\ max}$ prior to surge; $V_R = V_{RWM\ max}$.



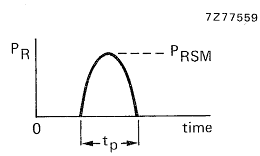


Fig. 11 Non-repetitive peak reverse power in the avalanche region; T_j = 25 °C prior to surge; typical values.

CONTROLLED AVALANCHE RECTIFIER DIODES

Glass passivated rectifier diodes in hermetically sealed leadless SMID* envelopes and intended for general purpose rectifier applications.

The device is capable of absorbing reverse transient energy.

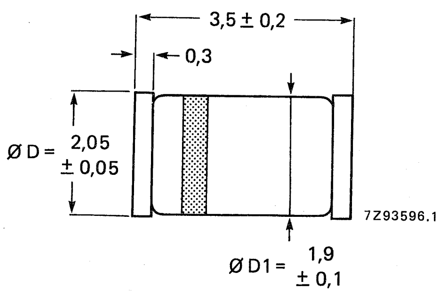
QUICK REFERENCE DATA

			BYD17D	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.			1,5			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			^oC

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-87.



* Surface-mounted implosion diode.

RATINGS

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

			BYD17D	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} = 105 °C;	$I_{F(AV)}$	max.			1,5			A
T_{amb} = 65 °C; p.c. board mounting	$I_{F(AV)}$	max.			0,6			A
Repetitive peak forward current T_{tp} = 55 °C; f = 50 Hz; a = 3; (inclusive derating for $T_{j\,max}$ at V_{RRM} = 1000 V)	I_{FRM}	max.			5,5			A
Non-repetitive peak forward current t = 10 ms, half-sinewave; T_j = $T_{j\,max}$ prior to surge; $V_R = V_{RWMmax}$	I_{FSM}	max.			20			A
Non-repetitive peak reverse power dissipation; t = 20 μs (half-sinewave); 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 = $T_{j\,max}$ 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	$R_{th\,j\text{-}tp}$	=	30	K/W
2. Thermal resistance from junction to ambient; device mounted on an 1,5 mm thick epoxy-glass p.c. board; Cu-thickness ⩾ 40 μm (see Fig. 2)	$R_{th\,j\text{-}a}$	=	150	K/W

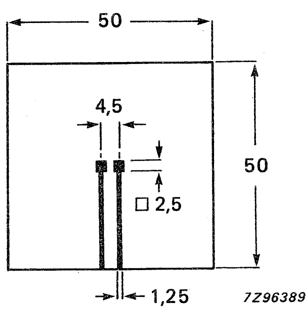


Fig. 2 Mounted on a p.c. board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD17D	G	J	K	M	
Forward voltage*								
I_F = 1 A; $T_j = T_{j\,max}$	V_F	<	0,93	0,93	0,93	0,93	0,93	V
I_F = 1 A	V_F	<	1,05	1,05	1,05	1,05	1,05	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

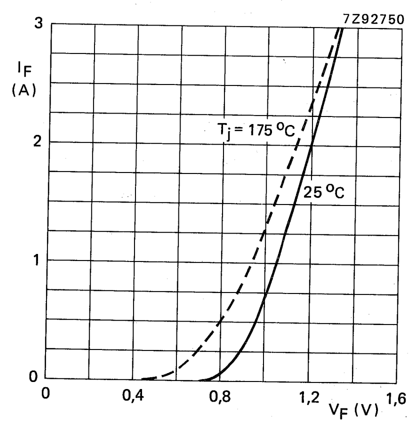


Fig. 3 Maximum forward voltage.

* Measured under pulse conditions to avoid excessive dissipation.

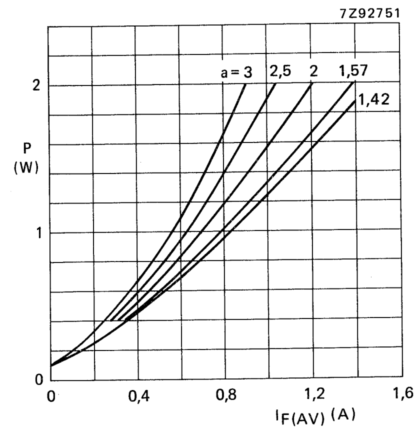


Fig. 4 Maximum values steady power dissipation (forward plus leakage current) as a function of the average (a) forward current. $a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

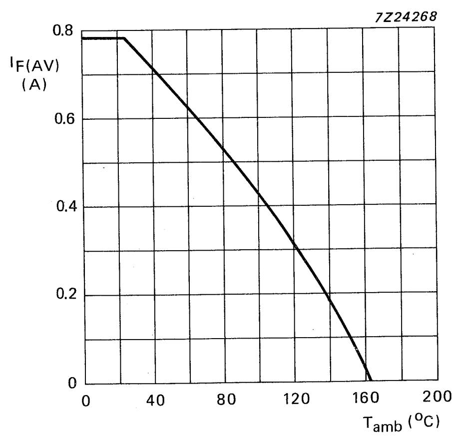


Fig. 5 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$, $\delta = 0.5$; a = 1.57.

——— = ambient temperature and device mounted as shown in Fig. 2.

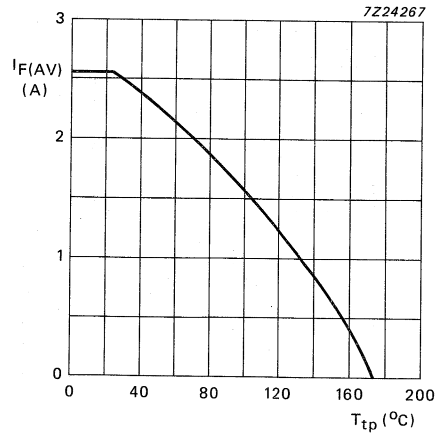


Fig. 6 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.
$V_R = V_{RWMmax}$, $\delta = 0.5$; a = 1.57.
——— = tie-point temperature and device mounted as shown in Fig. 2.

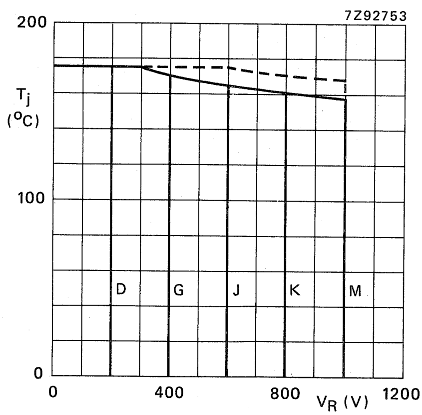


Fig. 7 Maximum permissible junction temperature as a function of reverse voltage;
——— = V_R; – – – – = V_{RWM}, $\delta = 0.5$.

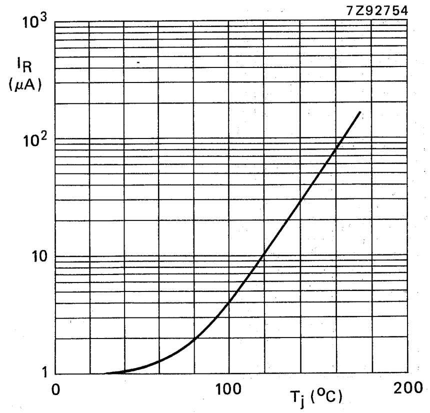


Fig. 8 Maximum values reverse current as a function of junction temperature; $V_R = V_{RWMmax}$.

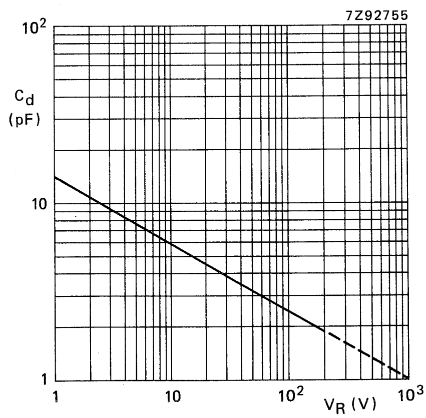


Fig. 9 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

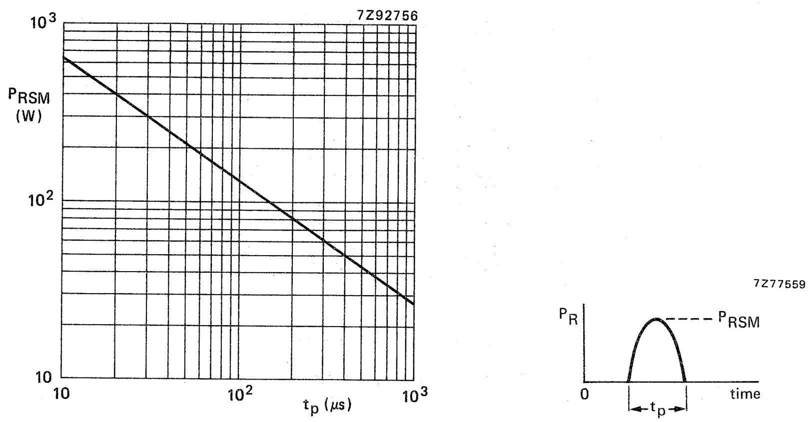


Fig. 10 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region; $T_j = T_{jmax}$.

Avalanche fast soft-recovery rectifier diodes

BYD31 series

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed SOD91 implosion diode (ID) glass envelopes, intended for television and industrial applications. The devices feature non-snap-off (soft-recovery) switching characteristics and are capable of absorbing reverse transient power dissipation.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		
	BYD31D	200	V
	BYD31G	400	V
	BYD31J	600	V
	BYD31K	800	V
	BYD31M	1000	V
V_R	continuous reverse voltage		
	BYD31D	200	V
	BYD31G	400	V
	BYD31J	600	V
	BYD31K	800	V
	BYD31M	1000	V
$I_{F(AV)}$	average forward current	440	mA
I_{FSM}	non-repetitive peak forward current	5	A
t_{rr}	reverse recovery time		
	BYD31D, G and J	250	ns
	BYD31K and M	300	ns

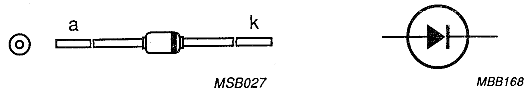


Fig.1 Simplified outline (SOD91) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD31D		–	200	V
	BYD31G		–	400	V
	BYD31J		–	600	V
	BYD31K		–	800	V
	BYD31M		–	1000	V
V_R	continuous reverse voltage				
	BYD31D		–	200	V
	BYD31G		–	400	V
	BYD31J		–	600	V
	BYD31K		–	800	V
	BYD31M		–	1000	V
$I_{F(AV)}$	average forward current	a = 1.42; T_{tp} = 55 °C; lead length = 10 mm	–	440	mA
		T_{amb} = 60 °C; see Fig.2	–	320	mA
I_{FRM}	repetitive peak forward current	T_{tp} = 55 °C; f = 50 kHz; δ = 0.05	–	4	A
		T_{amb} = 60 °C; f = 50 kHz; δ = 0.05	–	3	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine-wave; $T_j = T_{j\ max}$ prior to surge; $V_{RRM} = V_{RRM\ max}$	–	5	A
P_{RSM}	non-repetitive peak reverse power dissipation	t = 20 µs (half sine wave); $T_j = T_{j\ max}$ prior to surge			
	BYD31D, G and J		–	100	W
	BYD31K and M		–	50	W
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

Influence of mounting method.

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	180 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	250 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 µm, see Fig.2.

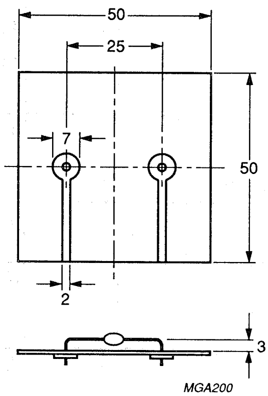


Fig.2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 0.5 A; $T_j = T_{j\,max}$; note 1	–	1.15	V
		I_F = 0.5 A note 1	–	1.35	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD31D		300	–	V
	BYD31G		500	–	V
	BYD31J		700	–	V
	BYD31K		900	–	V
	BYD31M		1100	–	V
I_R	reverse current	$V_R = V_{RRM\,max}$; note 2	–	1	μA
		$V_R = V_{RRM\,max}$; T_j = 165 °C	–	75	μA
t_{rr}	reverse recovery time	switched from I_F = 1 A to $V_R \geq 30$ V; with $-dI_F/dt$ = 20 A/μs			
	BYD31D, G and J		–	250	ns
	BYD31K and M		–	300	ns
Q_s	reverse recovery (recovered charge)	switched from I_F = 1 A to $V_R \geq 30$ V; with $-dI_F/dt$ = 20 A/μs			
	BYD31D, G and J		–	250	nC
	BYD31K and M		–	400	nC
$\lvert dI_R/dt \rvert$	maximum slope of reverse recovery current	switched from I_F = 1 A to $V_R \geq 30$ V; with $-dI_F/dt$ = 1 A/μs			
	BYD31D, G and J		–	6	A/μs
	BYD31K and M		–	5	A/μs

Notes

1. Measured under pulse conditions to avoid excessive dissipation.
2. Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

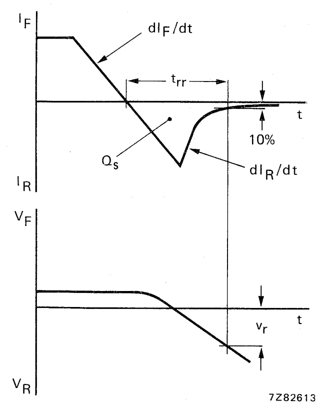


Fig.3 Definitions of t_{rr}, Q_s, dI_F/dt and dI_R/dt.

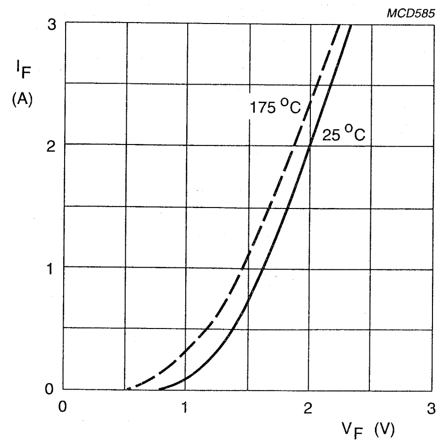
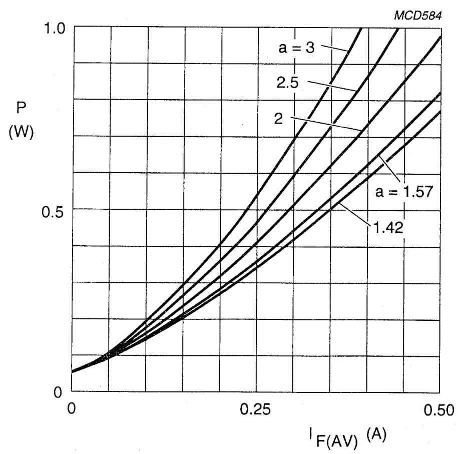
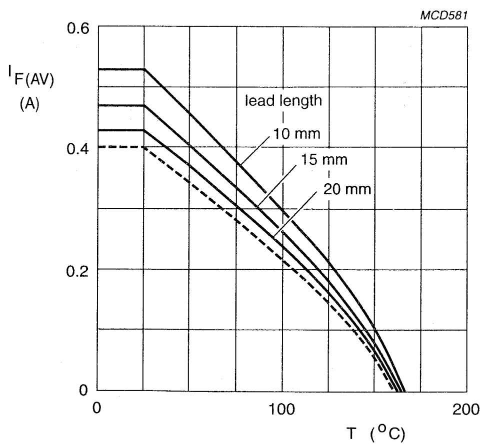


Fig.4 Maximum forward voltage drop.



$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Fig.5 Maximum values of steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current; switched mode application.

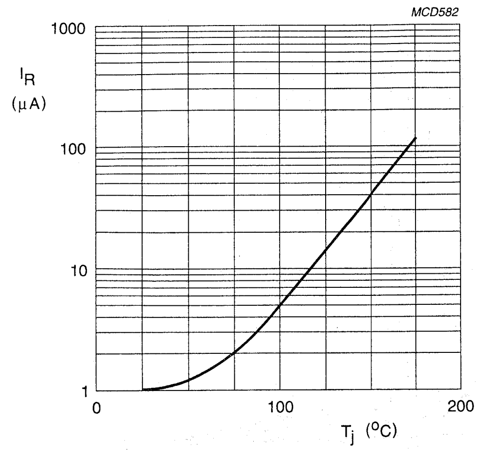


$V_R = V_{RRM\ max}$, $\delta = 0.5$; a = 1.42.

Dotted line = ambient temperature and device mounted as shown in Fig.2.

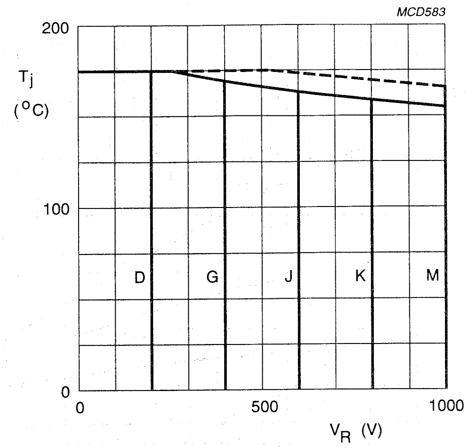
Solid line = tie-point temperature.

Fig.6 Maximum average forward current as a function of temperature (including losses due to leakage); switched mode application.



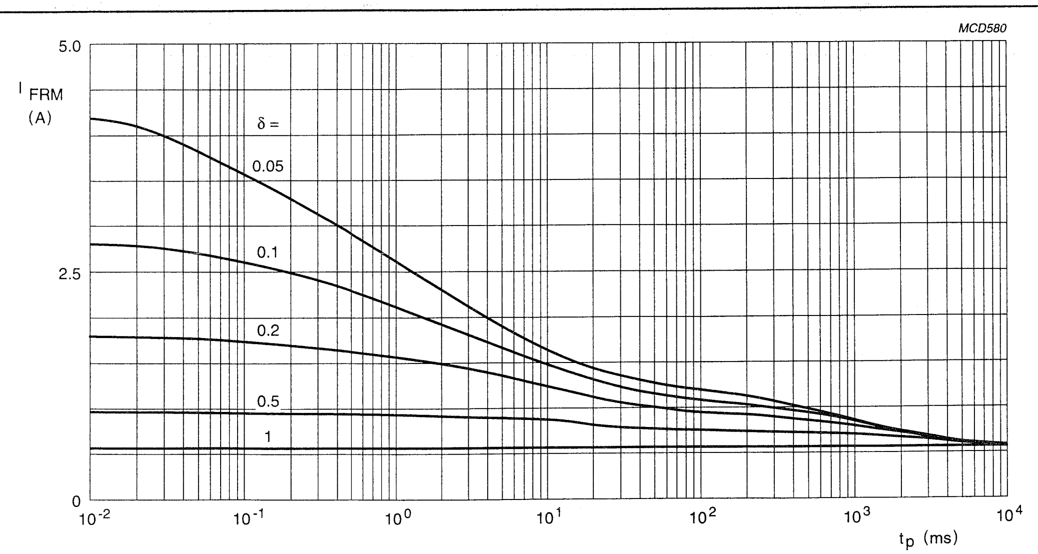
$V_R = V_{RRM\ max}$.

Fig.7 Reverse current as a function of junction temperature.



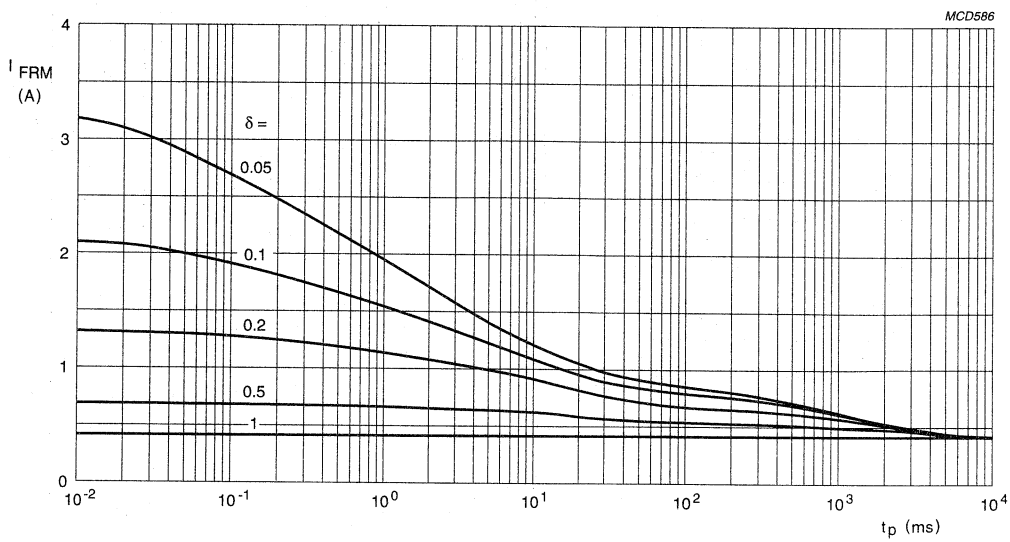
V_{RRM}, $\delta = 0.5$; $R_{th\ j\text{-}a} = 250$ K/W.
Solid line = V_R.

Fig.8 Maximum permissible junction temperature as a function of reverse voltage.



δ at $T_{tp} = 55$ °C; $R_{th\ j\text{-}tp} = 180$ K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at $V_{RRM} = 1000$ V.

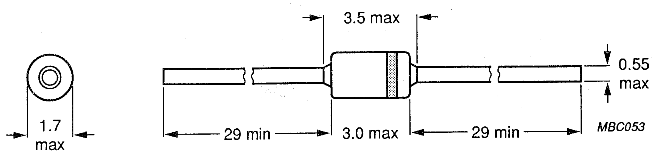
Fig.9 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 250 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

Fig.10 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.11 SOD91.

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 a picture tube).

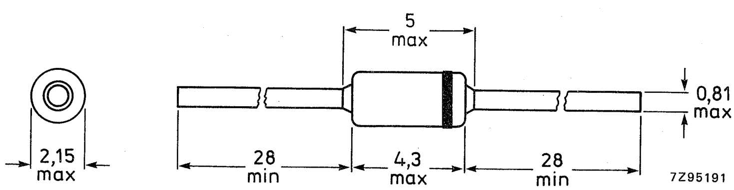
QUICK REFERENCE DATA

			BYD33D	G	J	K	M	
Repetitive peak reverse voltage	V_{RRM}	max.	200	400	600	800	1000	V
Continuous reverse voltage	V_R	max.	200	400	600	600	1000	V
Average forward current	$I_{F(AV)}$	max.		1,3			1,3	A
Non-repetitive peak forward current	I_{FSM}	max.		20			20	A
Non-repetitive peak reverse energy	E_{RSM}	max.		10			7	mJ
Reverse recovery time	t_{rr}	<		250			300	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	K	M	
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

			BYD33D; G; J	K; M	
Average forward current (averaged over any 20 ms period)					
T_{tp} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.	1,3	1,3	A
T_{amb} = 65 °C; see Fig. 2	$I_{F(AV)}$	max.	0,7	0,7	A
Repetitive peak forward current					
T_{tp} = 55 °C; see Fig. 10	I_{FRM}	max.	12	12	A
T_{amb} = 65 °C; see Fig. 11	I_{FRM}	max.	7	7	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.	20	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	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 a 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

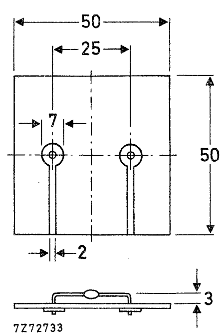


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD33D	G	J	K	M	
Forward voltage*								
I_F = 1 A	V_F	<	1,3	1,3	1,3	1,3	1,3	V
I_F = 1 A; $T_j = T_{j\,max}$	V_F	<	1,1	1,1	1,1	1,1	1,1	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	μA
$V_R = V_{RRMmax}$; T_j = 165 °C	I_R	<		100			100	μA
Reverse recovery when switched from I_F = 1 A to $V_R \geqslant$ 30 V with $-dI_F/dt$ = 20 A/μs								
recovery charge	Q_s	<		250			400	nC
recovery time	t_{rr}	<		250			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	$\lvert dI_R/dt \rvert$	<		6			5	A/μs

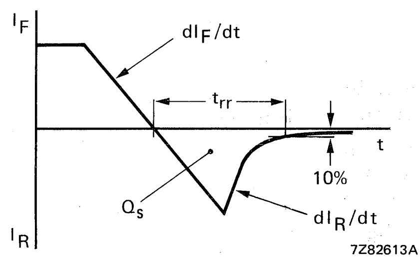


Fig. 3 Definitions of t_{rr}, Q_s, dI_F/dt and dI_R/dt.

* Measured under pulse conditions to avoid excessive dissipation.

** Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

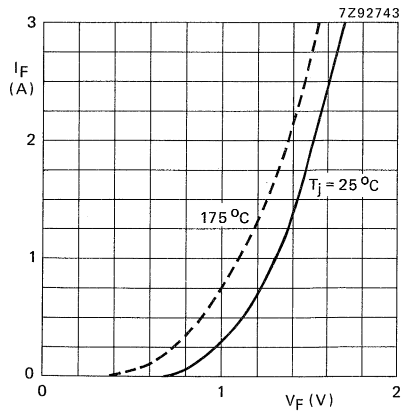


Fig. 4 Maximum forward voltage.

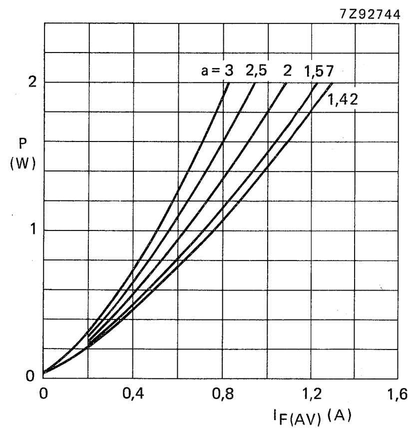
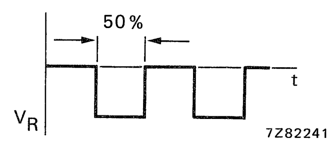


Fig. 5 Maximum values steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\,max}$.



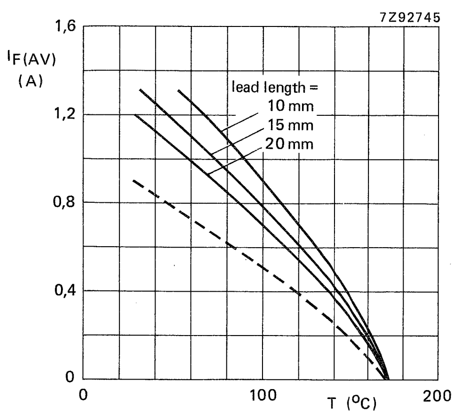


Fig. 6 Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application.

$V_R = V_{RRM\,max}$, δ = 0,5 ; a = 1,42.

– – – = ambient temperature and device mounted as shown in Fig. 2

——— = tie-point temperature

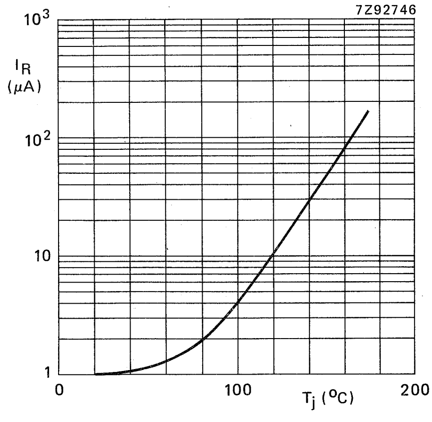


Fig. 7 Maximum values reverse current as a function of junction temperature; $V_R = V_{RRM\,max}$.

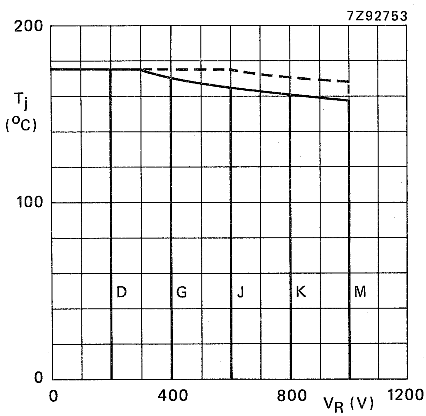


Fig. 8 Maximum permissible junction temperature as a function of reverse voltage;
—— = V_R; – – – = V_{RRM}, δ = 0,5.

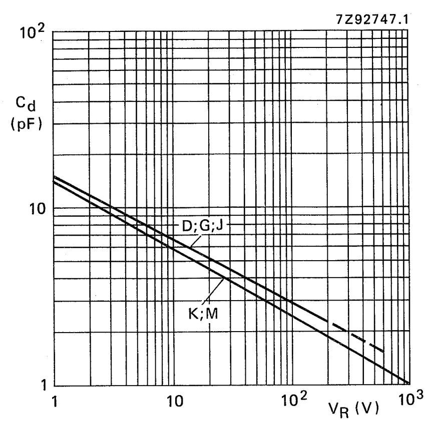


Fig. 9 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

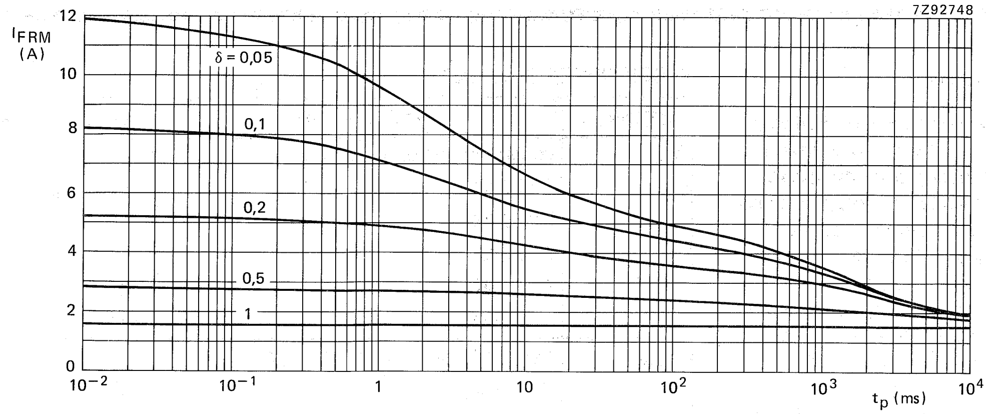


Fig. 10 Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 60 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

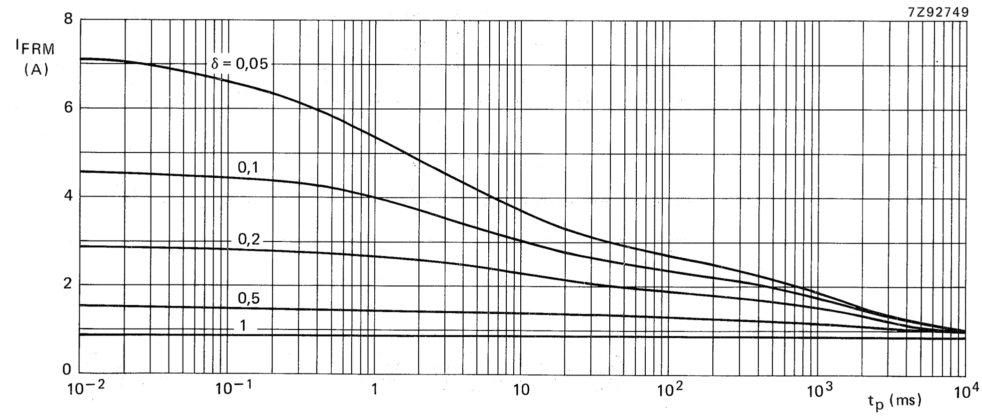


Fig. 11 Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 120 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

Avalanche fast soft-recovery rectifier diodes

BYD34 series

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed axial-leaded ID (implosion diode) glass envelopes. They are intended for television and industrial applications, such as Switched Mode Power Supplies (SMPS), 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 a picture tube).

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD34D	200	V
	BYD34G	400	V
	BYD34J	600	V
	BYD34K	800	V
	BYD34M	1000	V
V_{RRM}	repetitive peak reverse voltage		
	BYD34D	200	V
	BYD34G	400	V
	BYD34J	600	V
	BYD34K	800	V
	BYD34M	1000	V
$I_{F(AV)}$	average forward current	1.8	A
I_{FSM}	non-repetitive peak forward current		
	BYD34D, G and J	45	A
	BYD34K and M	35	A
E_{RSM}	non-repetitive peak reverse energy	10	mJ
t_{rr}	reverse recovery time		
	BYD34D, G and J	250	ns
	BYD34K and M	300	ns

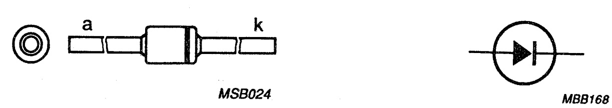


Fig.1 Simplified outline (SOD84) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD34D		–	200	V
	BYD34G		–	400	V
	BYD34J		–	600	V
	BYD34K		–	800	V
	BYD34M		–	1000	V
V_R	continuous reverse voltage				
	BYD34D		–	200	V
	BYD34G		–	400	V
	BYD34J		–	600	V
	BYD34K		–	800	V
	BYD34M		–	1000	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{tp} = 55 °C; lead length = 10 mm	–	1.8	A
		averaged over any 20 ms period; T_{amb} = 60 °C; see Fig.2	–	1	A
I_{FRM}	repetitive peak forward current	T_{tp} = 55 °C; see Fig.12	–	17	A
		T_{amb} = 60 °C; see Fig.13	–	9	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine-wave; $T_j = T_{j\ max}$ prior to surge; $V_R = V_{RRM\ max}$			
	BYD34D, G and J		–	45	A
	BYD34K and M		–	35	A
E_{RSM}	non-repetitive peak reverse avalanche energy	I_R = 400 mA; $T_j = T_{j\ max}$ prior to surge; with inductive load switched off	–	10	mJ
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	50 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	105 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 μm, see Fig.2.

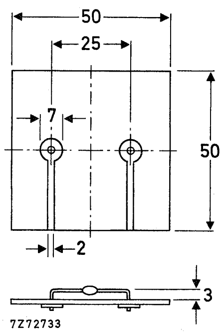


Fig.2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 3 A; $T_j = T_{j\,max}$; note 1	–	1.2	V
		I_F = 3 A; note 1	–	1.4	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD34D		300	–	V
	BYD34G		500	–	V
	BYD34J		700	–	V
	BYD34K		900	–	V
	BYD34M		1100	–	V
I_R	reverse current	$V_R = V_{RRM\,max}$; note 2	–	1	µA
		$V_R = V_{RRM\,max}$; T_j = 165 °C; note 2	–	150	µA
t_{rr}	reverse recovery time	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/µs			
	BYD34D, G and J		–	250	ns
	BYD34K and M		–	300	ns
Q_s	reverse recovery (recovered charge)	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/µs			
	BYD34D, G and J		–	250	nC
	BYD34K and M		–	400	nC
$\|dI_R/dt\|$	maximum slope of reverse recovery current	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 1 A/µs			
	BYD34D, G and J		–	6	A/µs
	BYD34K and M		–	5	A/µs

Notes

1. Measured under pulse conditions to avoid excessive dissipation.
2. Illuminance < 500 lux (daylight); relative humidity < 65%.

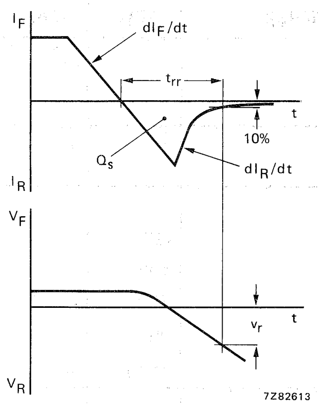


Fig.3 Definitions of t_{rr}, Q_s, dI_F/dt and dI_R/dt.

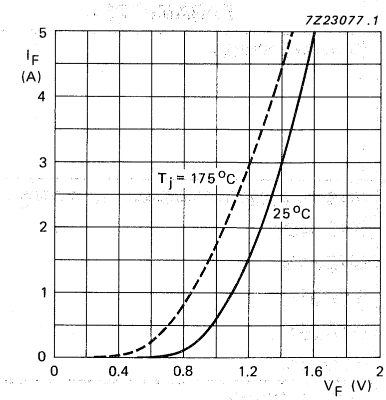
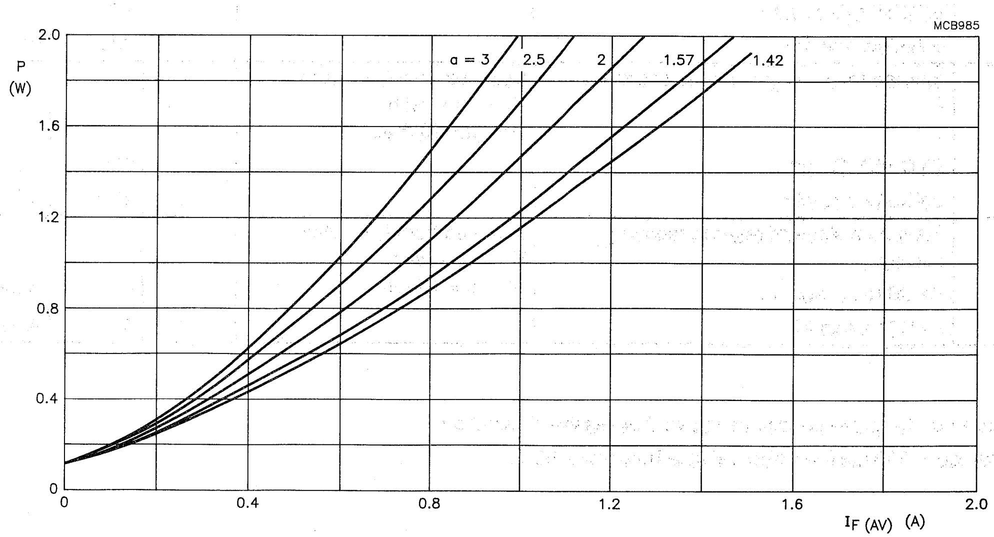
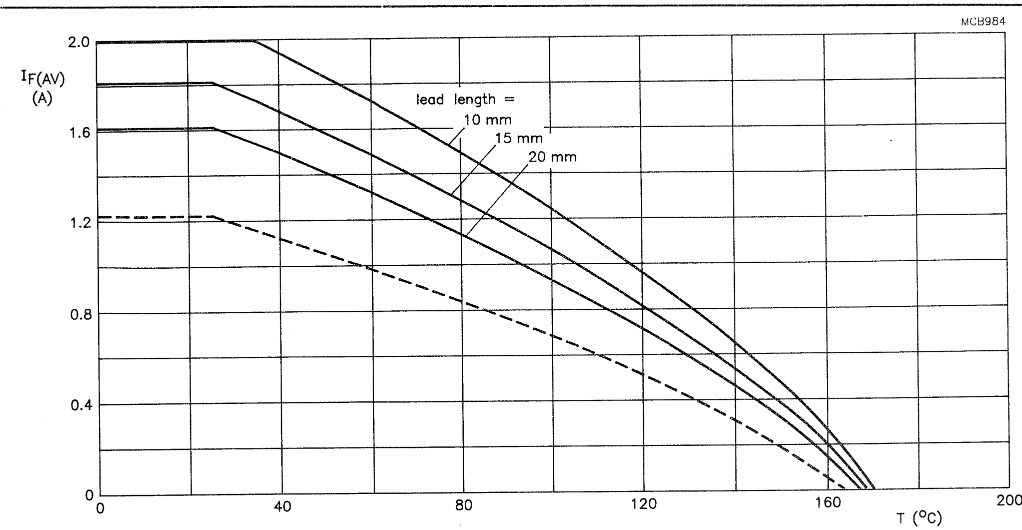


Fig.4 Forward voltage as a function of forward current.



$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Fig.5 Maximum values of steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current; switched mode application.

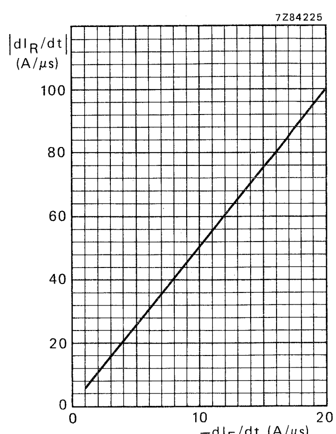


$V_R = V_{RRM\ max}$, $\delta = 0.5$; a = 1.42.

Dotted line = ambient temperature, and device mounted as shown in Fig.2.

Solid line = tie-point temperature.

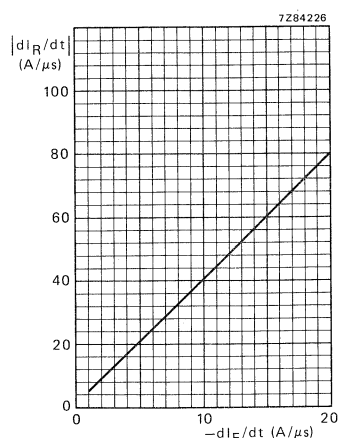
Fig.6 Maximum average forward current as a function of temperature (including losses due to reverse leakage); switched mode application.



BYD34D, G and J

T_j = 25 °C.

Fig.7 Maximum slope of reverse recovery current.



BYD34K and M

T_j = 25 °C.

Fig.8 Maximum slope of reverse recovery current.

Avalanche fast soft-recovery rectifier diodes

BYD34 series

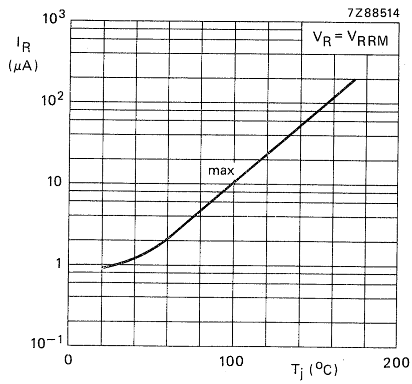
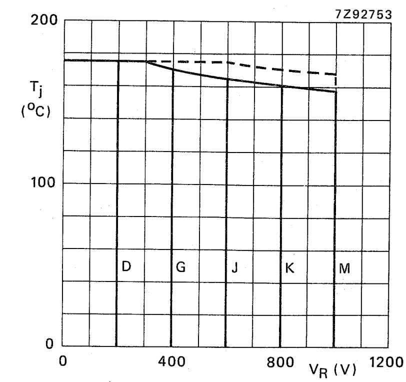


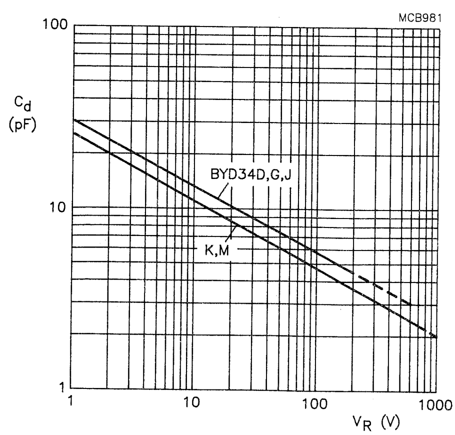
Fig.9 Reverse current as a function of junction temperature.



Dotted line = V_{RRM}; δ = 0.5; device mounted as shown in Fig.2.

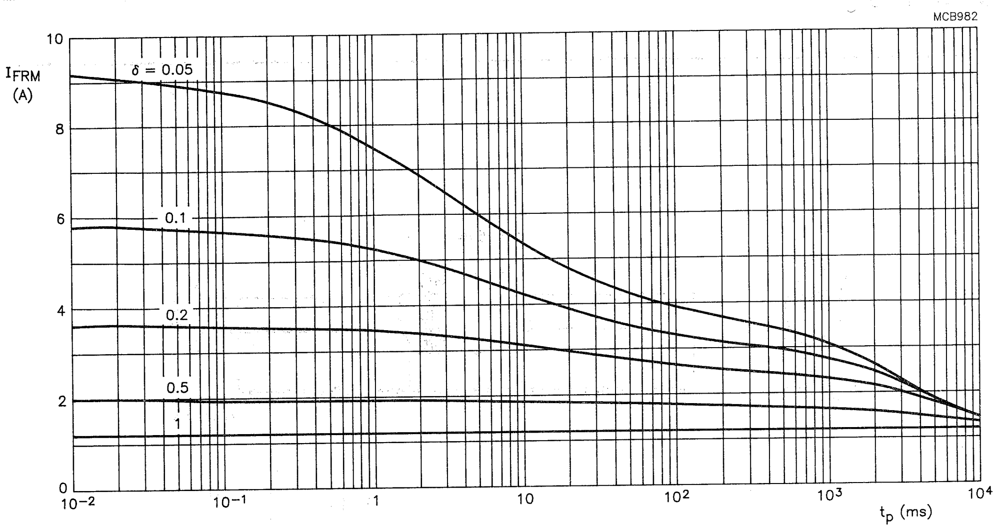
Solid line = V_R; device mounted as shown in Fig.2.

Fig.10 Maximum permissible junction temperature as a function of reverse voltage.



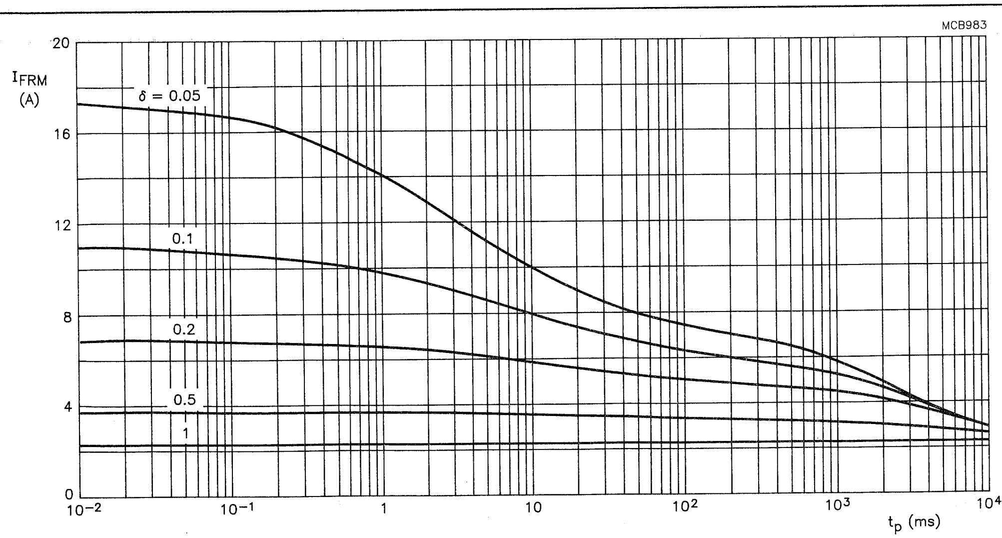
f = 1 MHz; T_j = 25 °C.

Fig.11 Diode capacitance as a function of reverse voltage, typical values.



δ at T_{tp} = 55 °C; $R_{th\ j\text{-}tp}$ = 50 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

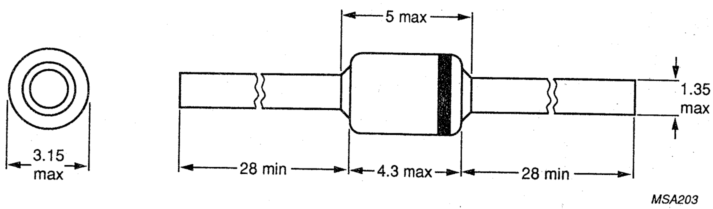
Fig.12 Maximum repetitive forward current as a function of pulse time and duty factor (δ).



δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 105 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

Fig.13 Maximum repetitive forward current as a function of pulse time and duty factor (δ).

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.14 SOD84.

Avalanche fast soft-recovery rectifier diodes

BYD37 series

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed surface mounted implosion diode (SMID) glass envelopes. They are intended for television and industrial applications, such as Switched Mode Power Supplies (SMPS), 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 a picture tube).

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD37D	200	V
	BYD37G	400	V
	BYD37J	600	V
	BYD37K	800	V
	BYD37M	1000	V
V_{RRM}	repetitive peak reverse voltage		
	BYD37D	200	V
	BYD37G	400	V
	BYD37J	600	V
	BYD37K	800	V
	BYD37M	1000	V
$I_{F(AV)}$	average forward current	1.5	A
I_{FSM}	non-repetitive peak forward current	20	A
E_{RSM}	non-repetitive peak reverse energy		
	BYD37D, G and J	10	mJ
	BYD37K and M	7	mJ
t_{rr}	reverse recovery time		
	BYD37D, G and J	250	ns
	BYD37K and M	300	ns

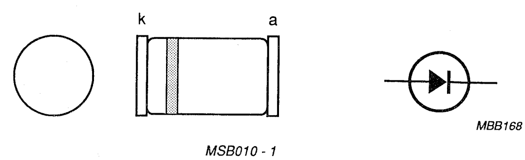


Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD37D		–	200	V
	BYD37G		–	400	V
	BYD37J		–	600	V
	BYD37K		–	800	V
	BYD37M		–	1000	V
V_R	continuous reverse voltage				
	BYD37D		–	200	V
	BYD37G		–	400	V
	BYD37J		–	600	V
	BYD37K		–	800	V
	BYD37M		–	1000	V
$I_{F(AV)}$	average forward current	$\delta = 0.5$; $T_{tp} = 105$ °C	–	1.5	A
		$T_{amb} = 60$ °C; $\delta = 0.5$; see Fig.2	–	0.6	A
I_{FRM}	repetitive peak forward current	$T_{tp} = 105$ °C; see Fig.11	–	13.0	A
		$T_{amb} = 65$ °C; see Fig.12	–	5.5	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRM\,max}$	–	20	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$I_R = 400$ mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off			
	BYD37D, G and J		–	10	mJ
	BYD37K and M		–	7	mJ
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint		30 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	105 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 μm, see Fig.2.

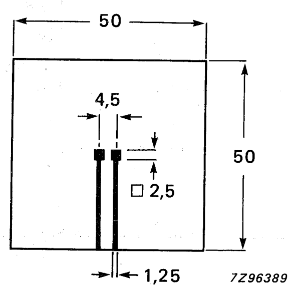


Fig.2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 1 A; $T_j = T_{j\,max}$; note 1	–	1.1	V
		I_F = 1 A; note 1	–	1.3	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD37D		300	–	V
	BYD37G		500	–	V
	BYD37J		700	–	V
	BYD37K		900	–	V
	BYD37M		1100	–	V
I_R	reverse current	$V_R = V_{RRM\,max}$	–	1	µA
		$V_R = V_{RRM\,max}$; T_j = 165 °C	–	100	µA
t_{rr}	reverse recovery time	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/µs			
	BYD37D, G and J		–	250	ns
	BYD37K and M		–	300	ns
Q_s	reverse recovery (recovered charge)	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 20 A/µs			
	BYD37D, G and J		–	250	nC
	BYD37K and M		–	400	nC
$\lvert dI_R/dt \rvert$	maximum slope of reverse recovery current	switched from I_F = 1 A to V_R > 30 V; with $-dI_F/dt$ = 1 A/µs			
	BYD37D, G and J		–	6	A/µs
	BYD37K and M		–	5	A/µs

Note

1. Measured under pulse conditions to avoid excessive dissipation.

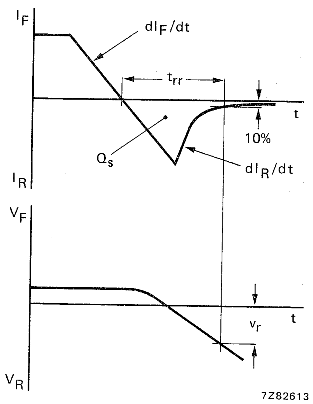


Fig.3 Definitions of t_{rr}, Q_s, and dI_R/d_t.

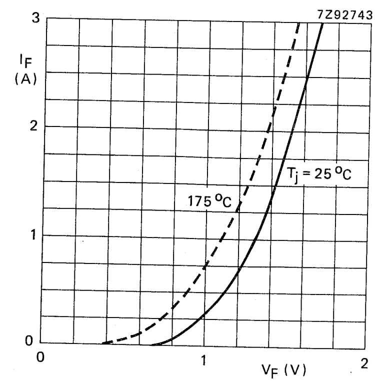
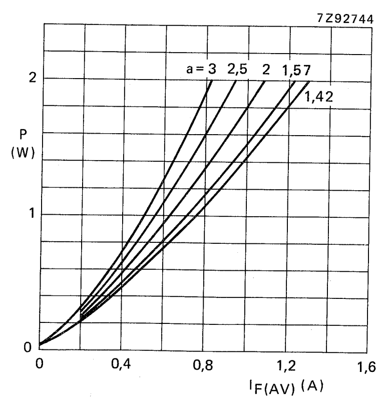
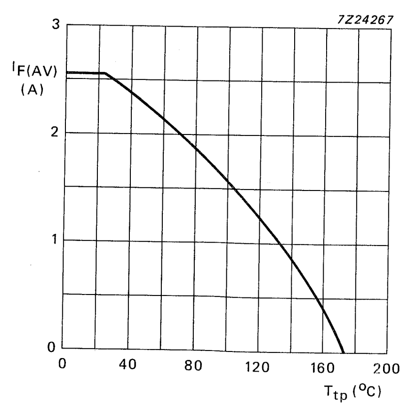


Fig.4 Forward current as a function of forward voltage.



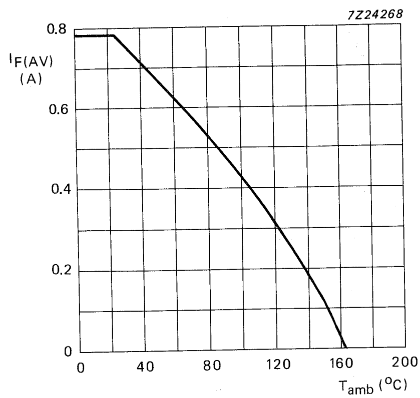
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Fig.5 Maximum values of steady state power dissipation (forward plus leakage currents, excluding switching losses) as a function of average forward current; switched mode application.



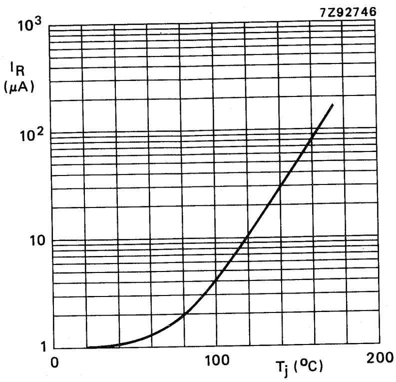
$V_R = V_{RRM\ max}$; $\delta = 0.5$; $a = 1.42$.
Solid line = measured at tie-point temperature.

Fig.6 Maximum average forward current as a function of temperature (including losses due to reverse leakage); switched mode application.



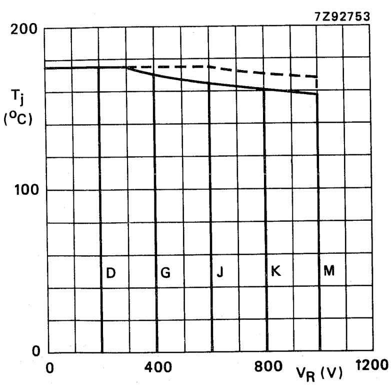
$V_R = V_{RRM\,max}$; $\delta = 0.5$; a = 1.42.
Solid line = measured at ambient temperature and device mounted as shown in Fig.2.

Fig.7 Maximum average forward current as a function of temperature (including losses due to reverse leakage); switched mode application.



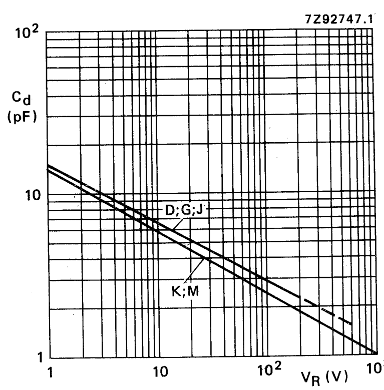
$V_R = V_{RRM\,max}$.

Fig.8 Reverse current as a function of junction temperature.



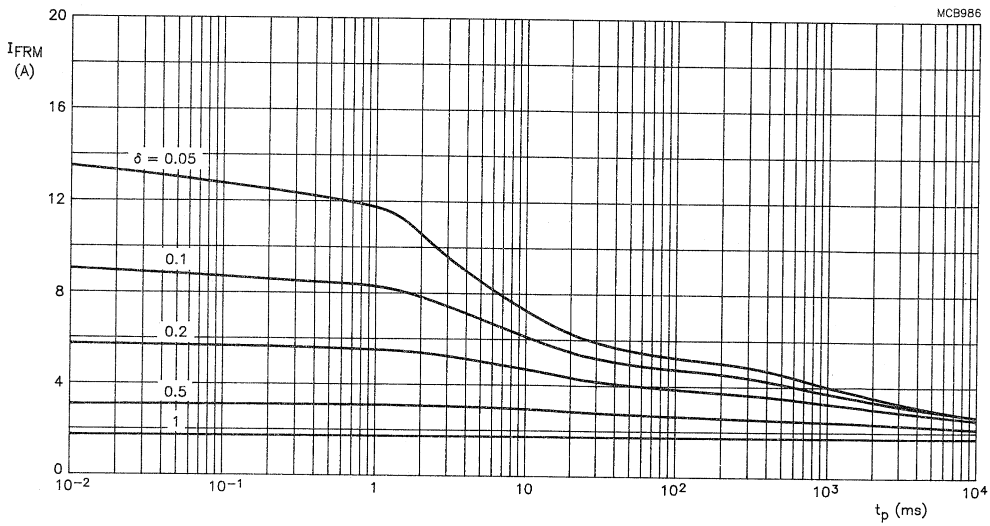
Dotted line = V_{RRM}; $\delta = 0.5$.
Solid line = V_R.

Fig.9 Maximum permissible junction temperature as a function of reverse voltage.



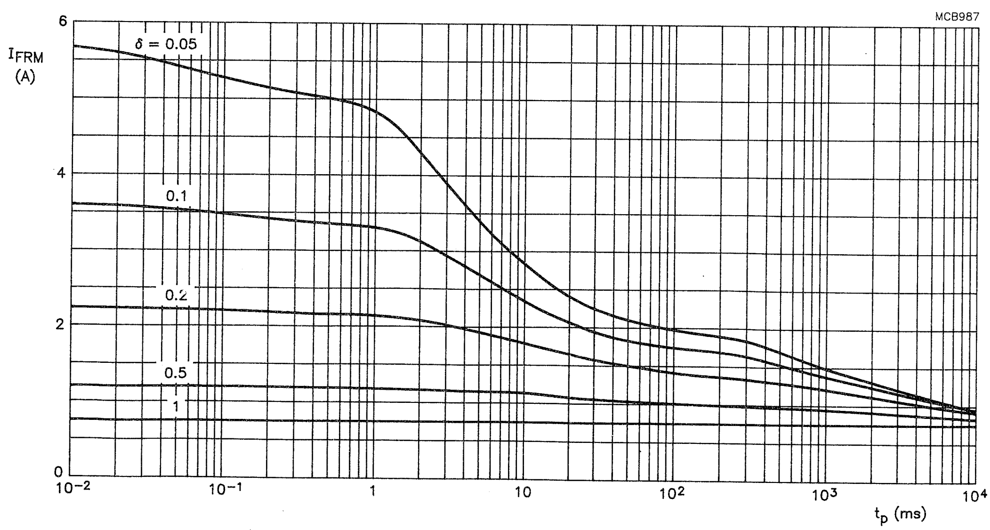
f = 1 MHz; $T_j = 25$ °C,

Fig.10 Diode capacitance as a function of reverse voltage.



δ at T_{tp} = 105 °C; $R_{th\ j\text{-}tp}$ = 30 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

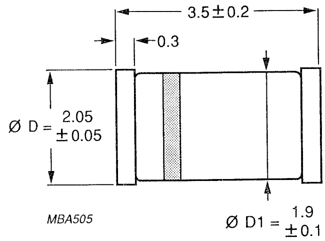
Fig.11 Maximum repetitive forward current as a function of pulse time and duty factor (δ).



δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 150 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

Fig.12 Repetitive forward current as a function of pulse time and duty factor (δ).

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.13 SOD87.

Very fast soft-recovery rectifier diodes

BYD43-20

DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed SOD81 glass envelopes, intended for applications such as high voltage starters for fluorescent lights, and for camera flash circuits. The devices feature non-snap-off (soft-recovery) switching characteristics.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	2000	V
V_{RSM}	non-repetitive peak reverse voltage	2100	V
$I_{F(AV)}$	average forward current	640	mA
I_{FSM}	non-repetitive peak forward current	10	A
t_{rr}	reverse recovery time	300	ns

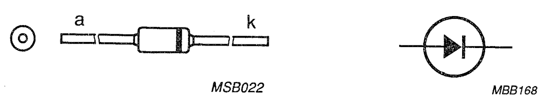


Fig.1 Simplified outline (SOD81) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		–	2000	V
V_{RSM}	non-repetitive peak reverse voltage		–	2100	V
$I_{F(AV)}$	average forward current	averaged over any 20 ms period; T_{tp} = 55 °C; lead length = 10 mm	–	640	mA
		T_{amb} = 25 °C averaged over any 20 ms period; see Fig.2	–	440	mA
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine-wave; $T_j = T_{j\,max}$ prior to surge; $V_{RRM} = V_{RRM\,max}$	–	10	A
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

Influence of mounting method.

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	60 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	120 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick, see Fig.2.

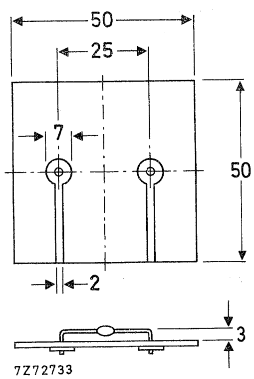


Fig.2 Device mounted on a printed circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 1 A	–	2.4	V
		I_F = 1 A; $T_j = T_{j\ max}$	–	2.05	V
I_R	reverse current	$V_R = V_{RRM\ max}$	–	5	µA
		$V_R = V_{RRM\ max}$; T_j = 125 °C	–	50	µA
t_{rr}	reverse recovery time	switched from I_F = 0.5 A to I_R = 1 A; measured at I_R = 0.25 A	–	300	ns
C_d	diode capacitance	V_R = 4 V; f = 1 MHz	6	–	pF

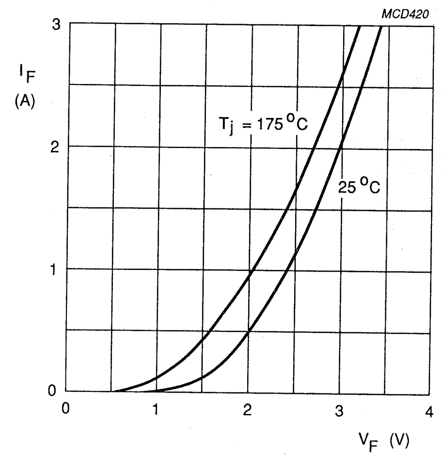


Fig.3 Forward voltage drop.

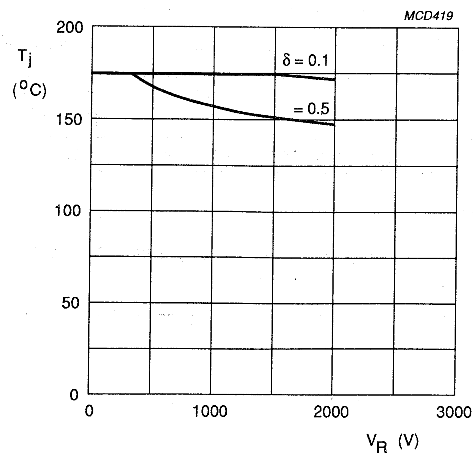
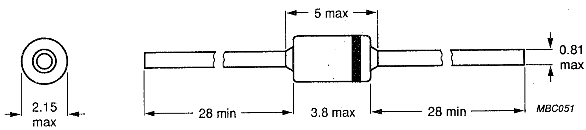


Fig.4 Maximum permissible junction temperature as a function of reverse voltage.

PACKAGE OUTLINE



Dimensions in mm.

Fig.5 SOD81.

Epitaxial avalanche diodes BYD71 series

DESCRIPTION

Rectifier diodes in hermetically sealed axial-leaded ID (implosion diode) 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 power dissipation.

These properties make the diodes very suitable for use in Switched Mode Power Supplies (SMPS) and in general high frequency circuits, where low conduction and switching losses are essential.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD71A	50	V
	BYD71B	100	V
	BYD71C	150	V
	BYD71D	200	V
	BYD71E	250	V
	BYD71F	300	V
	BYD71G	400	V
V_{RRM}	repetitive peak reverse voltage		
	BYD71A	50	V
	BYD71B	100	V
	BYD71C	150	V
	BYD71D	200	V
	BYD71E	250	V
	BYD71F	300	V
	BYD71G	400	V
$I_{F(AV)}$	average forward current		
	BYD71A to D	0.56	A
	BYD71E to G	0.54	A
I_{FSM}	non-repetitive peak forward current	7	A
t_{rr}	reverse recovery time		
	BYD71A to D	25	ns
	BYD71E to G	50	ns

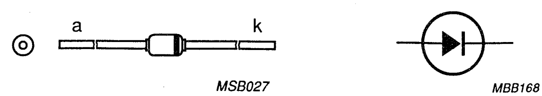


Fig.1 Simplified outline (SOD91) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD71A		–	50	V
	BYD71B		–	100	V
	BYD71C		–	150	V
	BYD71D		–	200	V
	BYD71E		–	250	V
	BYD71F		–	300	V
	BYD71G		–	400	V
V_R	continuous reverse voltage				
	BYD71A		–	50	V
	BYD71B		–	100	V
	BYD71C		–	150	V
	BYD71D		–	200	V
	BYD71E		–	250	V
	BYD71F		–	300	V
	BYD71G		–	400	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $T_{tp} = 55$ °C; lead length = 10 mm			
	BYD71A to D		–	0.56	A
	BYD71E to G		–	0.54	A
		$T_{amb} = 60$ °C; see Fig.2			
	BYD71A to D		–	0.43	A
	BYD71E to G		–	0.41	A
I_{FRM}	repetitive peak forward current	$T_{tp} = 55$ °C; $t_p = 20$ µs; $\delta = 0.05$			
	BYD71A to D		–	4.7	A
	BYD71E to G		–	5	A
		$T_{amb} = 60$ °C; $t_p = 20$ µs; $\delta = 0.05$			
	BYD71A to D		–	3.7	A
	BYD71E to G		–	3.9	A

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	–	7	A
P_{RSM}	non-repetitive peak reverse power dissipation	t = 20 µs (half sinewave); $T_j = T_{j\,max}$ prior to surge			
	BYD71A to D		–	250	W
	BYD71E to G		–	150	W
T_{stg}	storage temperature range		−65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\,j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	180 K/W
$R_{th\,j\text{-}a}$	from junction to ambient	note 1	250 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≥ 40 µm, see Fig.2.

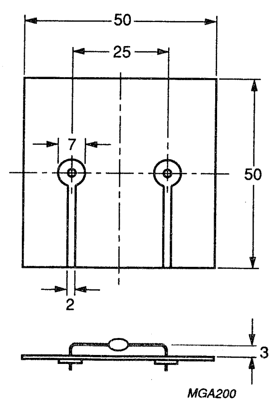


Fig.2 Device mounted on a printed circuit board.

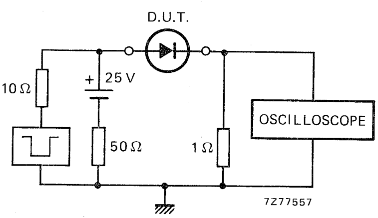
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 0.5 A; $T_j = T_{j\ max}$; note 1			
	BYD71A to D		–	0.84	V
	BYD71E to G		–	0.90	V
		I_F = 0.5 A; note 1			
	BYD71A to D		–	1.05	V
	BYD71E to G		–	1.11	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD71A		55	–	V
	BYD71B		110	–	V
	BYD71C		165	–	V
	BYD71D		220	–	V
	BYD71E		275	–	V
	BYD71F		330	–	V
	BYD71G		440	–	V
I_R	reverse current	$V_R = V_{RRM\ max}$;	–	1	µA
		$V_R = V_{RRM\ max}$; T_j = 165 °C	–	75	µA
t_{rr}	reverse recovery time	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.			
	BYD71A to D		–	25	ns
	BYD71E to F		–	50	ns

Note

1. Measured under pulse conditions to avoid excessive dissipation.



Input impedance oscilloscope 1 MΩ;
rise time ≤ 7 ns.

Source impedance 50 Ω; rise time ≤ 15 ns.

Fig.3 Test circuit.

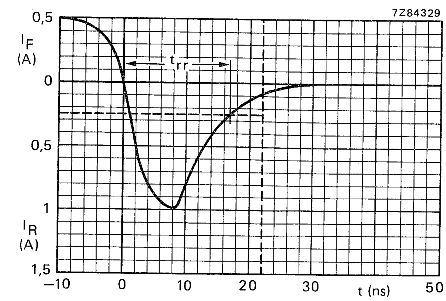
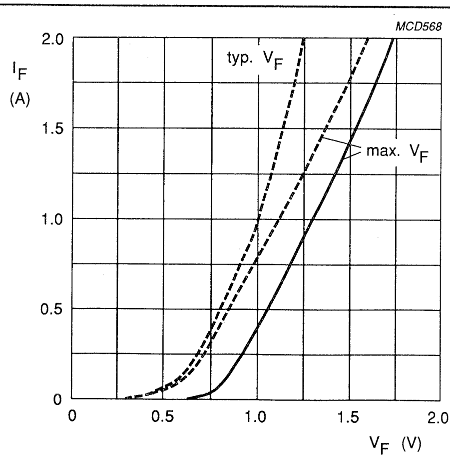


Fig.4 Reverse recovery time characteristics.

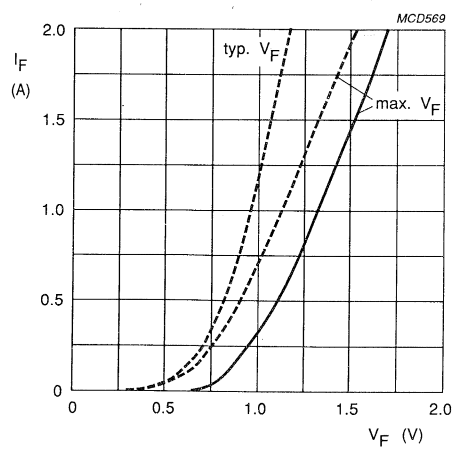


BYD71A to D.

Solid line: T_j = 25 °C.

Dotted line: $T_j = T_{j\ max}$.

Fig.5 Forward current as a function of forward voltage.



BYD71E to G.

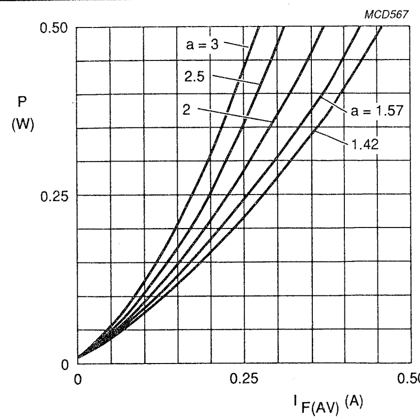
Solid line: T_j = 25 °C.

Dotted line: $T_j = T_{j\ max}$.

Fig.6 Forward current as a function of forward voltage.

Epitaxial avalanche diodes

BYD71 series

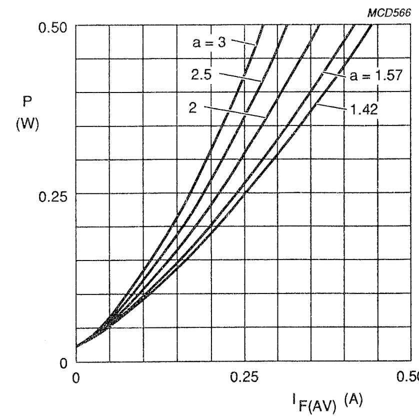


BYD71A to D.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$; $\delta = 0.5$.

Switched mode application.

Fig.7 Maximum values of steady state power dissipation as a function of average forward current.

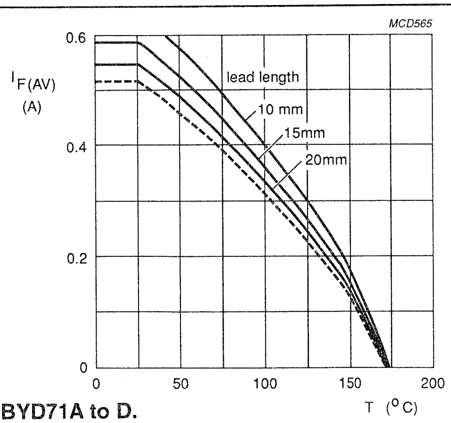


BYD71E to G.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$; $\delta = 0.5$.

Switched mode application.

Fig.8 Maximum values of steady state power dissipation as a function of average forward current.



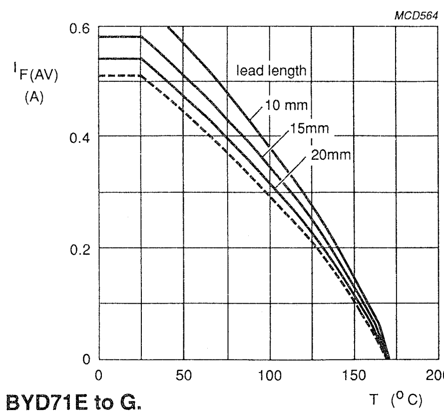
BYD71A to D.

$V_R = V_{RRM\ max}$; $\delta = 0.5$; $a = 1.42$.

Switched mode application.

Solid line: tie-point temperature; Dotted line: ambient temperature and device mounted as shown in Fig.2.

Fig.9 Maximum average forward current as a function of temperature (including losses due to reverse leakage).



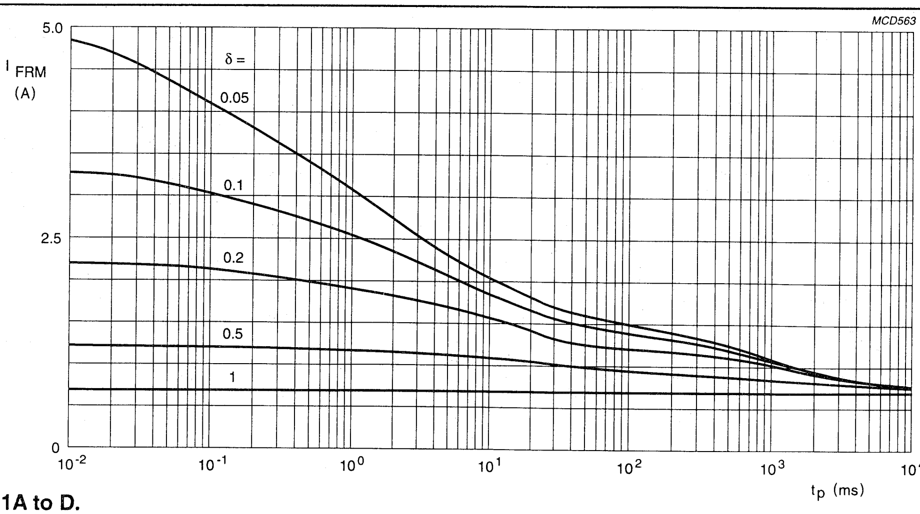
BYD71E to G.

$V_R = V_{RRM\ max}$; $\delta = 0.5$; $a = 1.42$.

Switched mode application.

Solid line: tie-point temperature; Dotted line: ambient temperature and device mounted as shown in Fig.2.

Fig.10 Maximum average forward current as a function of temperature (including losses due to reverse leakage).

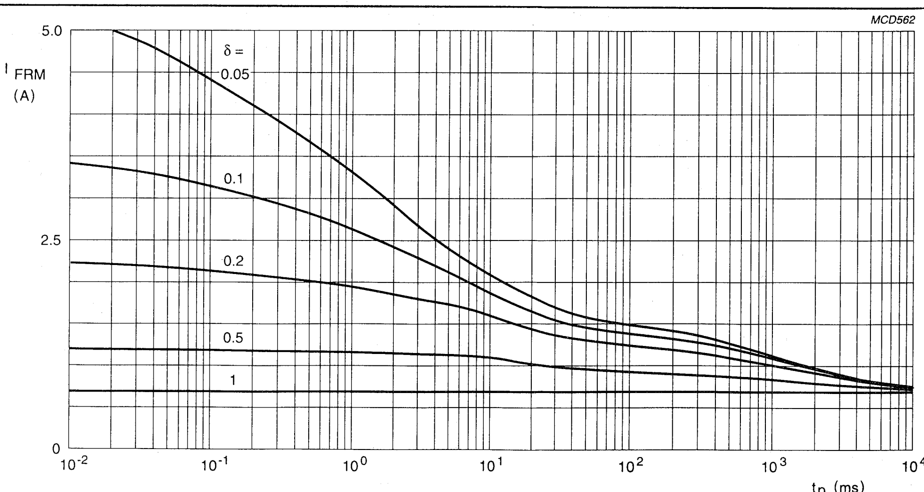


BYD71A to D.

Square pulse; duty factor δ at T_{tp} = 55 °C; $R_{th\ j\text{-}tp}$ = 180 K/W.

V_{RRM} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 200 V.

Fig.11 Repetitive peak forward current as a function of pulse time.

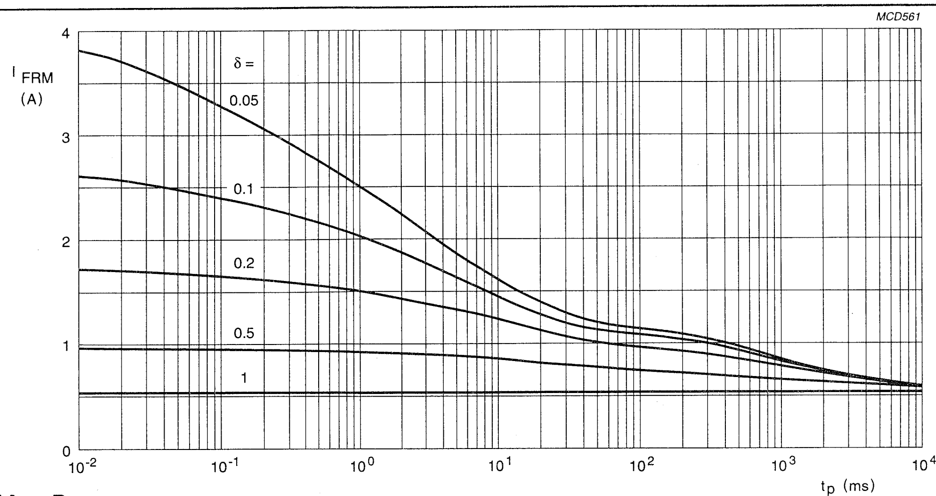


BYD71E to G.

Square pulse and duty factor δ at T_{tp} = 55 °C; $R_{th\ j\text{-}tp}$ = 180 K/W.

V_{RRM} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 400 V.

Fig.12 Repetitive peak forward current as a function of pulse time.

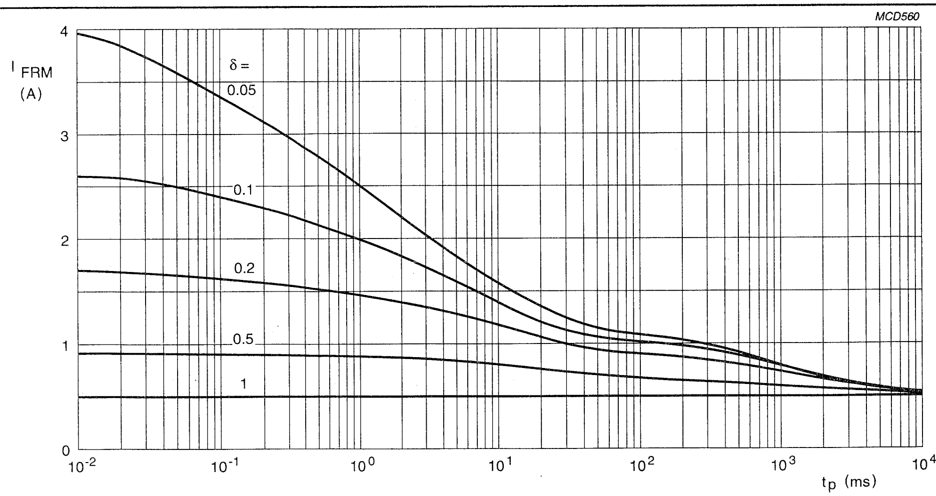


BYD71A to D.

Square pulse; duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 250 K/W.

V_{RRM} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 200 V.

Fig.13 Repetitive peak forward current as a function of pulse time.



BYD71E to G.

Square pulse and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 250 K/W.

V_{RRM} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 400 V.

Fig.14 Repetitive peak forward current as a function of pulse time.

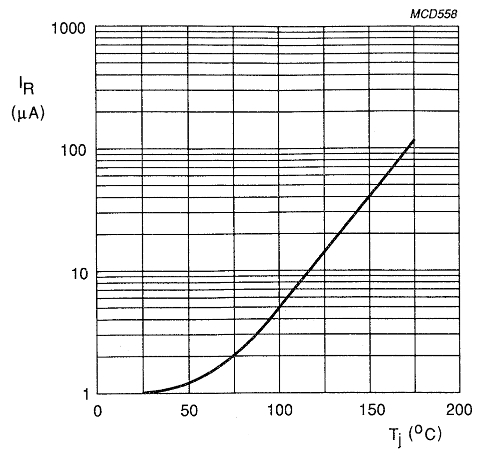
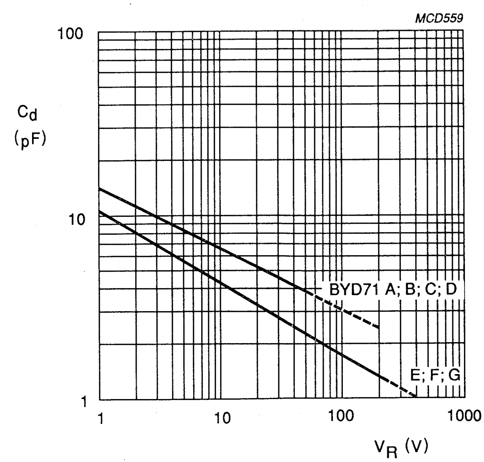


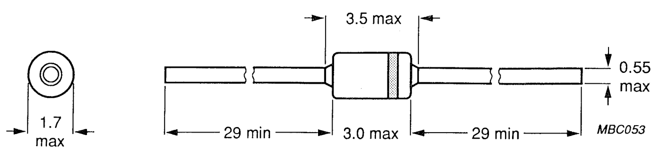
Fig.15 Reverse current as a function of junction temperature.



f = 1 MHz; T_j = 25 °C.

Fig.16 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.17 SOD91.

Epitaxial avalanche diodes BYD73 series

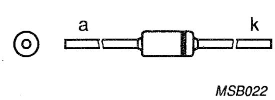
DESCRIPTION

Glass passivated rectifier diodes in hermetically sealed axial-leaded ID (implosion diode) 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 (SMPS) and in general high frequency circuits, where low conduction and switching losses are essential.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD73A	50	V
	BYD73B	100	V
	BYD73C	150	V
	BYD73D	200	V
	BYD73E	250	V
	BYD73F	300	V
	BYD73G	400	V
V_{RRM}	repetitive peak reverse voltage		
	BYD73A	50	V
	BYD73B	100	V
	BYD73C	150	V
	BYD73D	200	V
	BYD73E	250	V
	BYD73F	300	V
	BYD73G	400	V
$I_{F(AV)}$	average forward current		
	BYD73A to D	1.75	A
	BYD73E to G	1.7	A
I_{FSM}	non-repetitive peak forward current	25	A
E_{RSM}	non-repetitive peak reverse energy	20	mJ
t_{rr}	reverse recovery time		
	BYD73A to D	25	ns
	BYD73E to G	50	ns



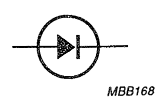


Fig.1 Simplified outline (SOD81) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD73A		–	50	V
	BYD73B		–	100	V
	BYD73C		–	150	V
	BYD73D		–	200	V
	BYD73E		–	250	V
	BYD73F		–	300	V
	BYD73G		–	400	V
V_R	continuous reverse voltage				
	BYD73A		–	50	V
	BYD73B		–	100	V
	BYD73C		–	150	V
	BYD73D		–	200	V
	BYD73E		–	250	V
	BYD73F		–	300	V
	BYD73G		–	400	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $T_{tp} = 55$ °C; lead length = 10 mm			
	BYD73A to D		–	1.75	A
	BYD73E to G		–	1.7	A
		$T_{amb} = 60$ °C; see Fig.2			
	BYD73A to D		–	1	A
	BYD73E to G		–	0.95	A
I_{FRM}	repetitive peak forward current				
	BYD73A to D		–	14	A
	BYD73E to G		–	15	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	–	25	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$I_R = 600$ mA; $T_j = 25$ °C prior to surge; with inductive load switched off	–	20	mJ
		$I_R = 400$ mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	–	10	mJ
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint	lead length 10 mm	60 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	120 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 μm, see Fig.2.

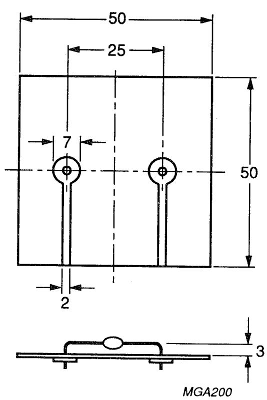


Fig.2 Device mounted on a printed circuit board.

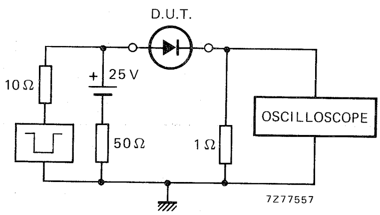
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 1 A; $T_j = T_{j\ max}$; note 1			
	BYD73A to D		–	0.75	V
	BYD73E to G		–	0.83	V
		I_F = 1 A; note 1			
	BYD73A to D		–	0.98	V
	BYD73E to G		–	1.05	V
$-V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD73A		55	–	V
	BYD73B		110	–	V
	BYD73C		165	–	V
	BYD73D		220	–	V
	BYD73E		275	–	V
	BYD73F		330	–	V
	BYD73G		440	–	V
I_R	reverse current	$V_R = V_{RRM\ max}$	–	1	µA
		$V_R = V_{RRM\ max}$; T_j = 165 °C	–	100	µA
t_{rr}	reverse recovery time	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.			
	BYD73A to D		–	25	ns
	BYD73E to F		–	50	ns

Note

1. Measured under pulse conditions to avoid excessive dissipation.



Input impedance oscilloscope 1 MΩ;
rise time ≤ 7 ns.

Source impedance 50 Ω; rise time ≤ 15 ns.

Fig.3 Test circuit.

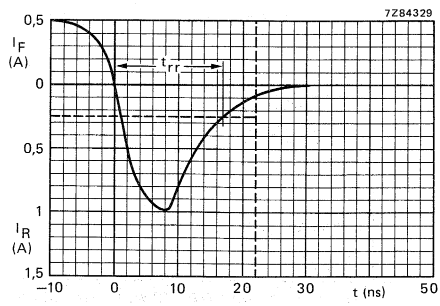
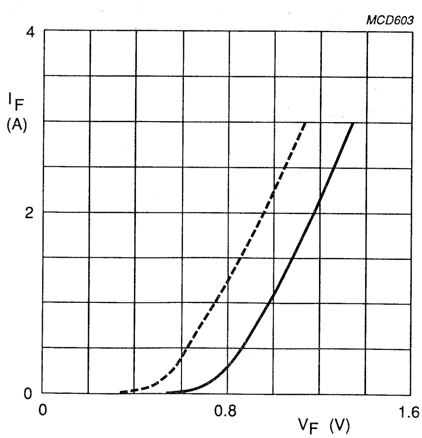


Fig.4 Reverse recovery time characteristics.

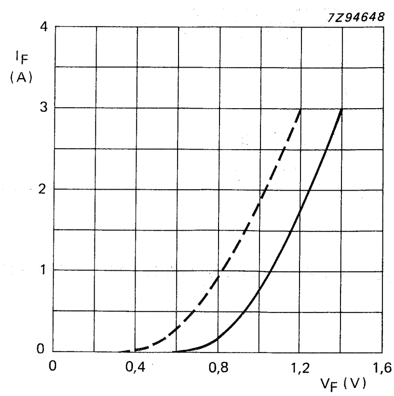


BYD73A to D.

Solid line: T_j = 25 °C.

Dotted line: T_j = 175 °C.

Fig.5 Forward current as a function of forward voltage.

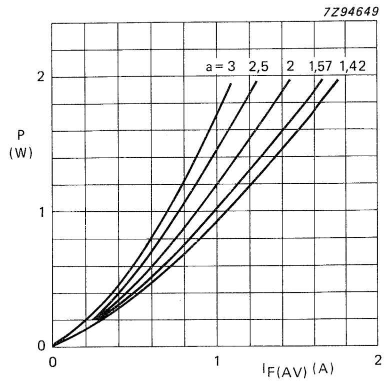


BYD73E to G.

Solid line: T_j = 25 °C.

Dotted line: T_j = 175 °C.

Fig.6 Forward current as a function of forward voltage.

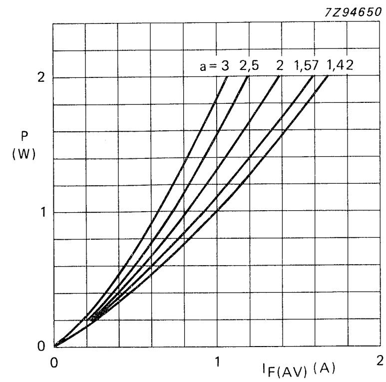


BYD73A to D.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Pulsed reverse voltage, $\delta = 0.5$.

Fig.7 Maximum values of steady state power dissipation as a function of average forward current.

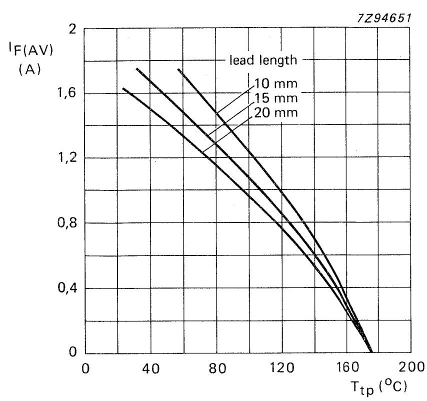


BYD73E to G.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\ max}$.

Pulsed reverse voltage, $\delta = 0.5$.

Fig.8 Maximum values of steady state power dissipation as a function of average forward current.

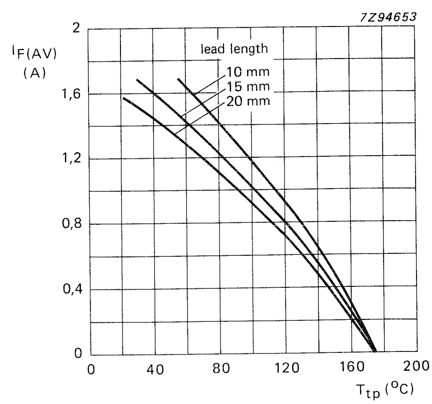


BYD73A to D.

$V_R = V_{RRM\ max}$; square wave current; a = 1.42.

Pulsed reverse voltage, $\delta = 0.5$.

Fig.9 Maximum average forward current as a function of tiepoint temperature (including losses due to reverse leakage).

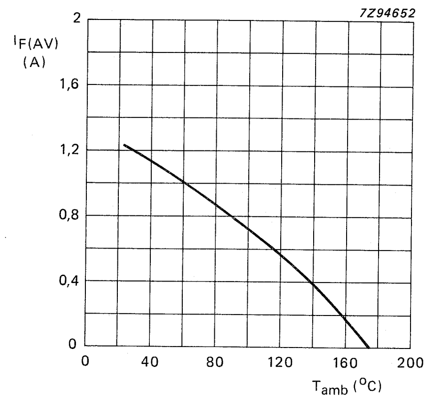


BYD73E to G.

$V_R = V_{RRM\ max}$; square wave current; a = 1.42.

Pulsed reverse voltage, $\delta = 0.5$.

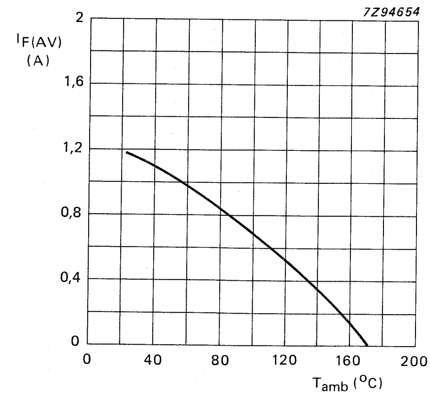
Fig.10 Maximum average forward current as a function of tiepoint temperature (including losses due to reverse leakage).



BYD73A to D.

$V_R = V_{RRM\ max}$; square wave current; a = 1.42.
Pulsed reverse voltage, δ = 0.5.

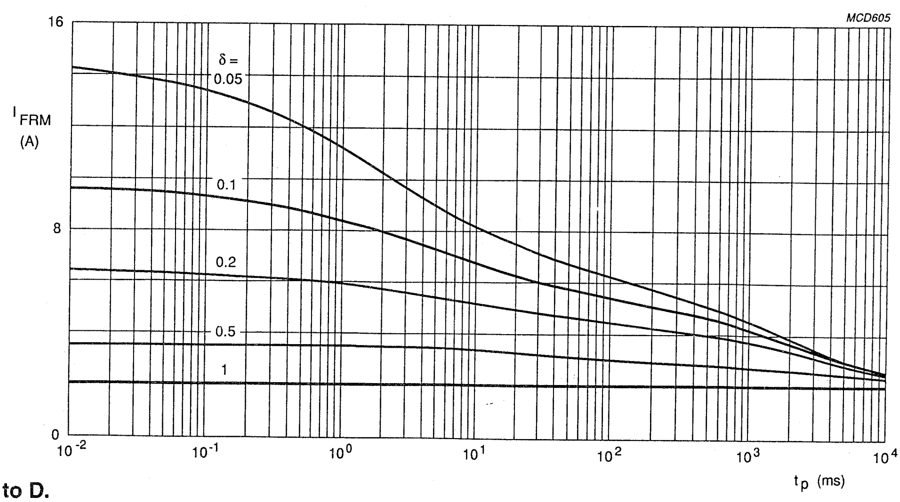
Fig.11 Maximum average forward current as a function of ambient temperature (including losses due to reverse leakage).



BYD73E to G.

$V_R = V_{RRM\ max}$; square wave current; a = 1.42.
Pulsed reverse voltage, δ = 0.5.

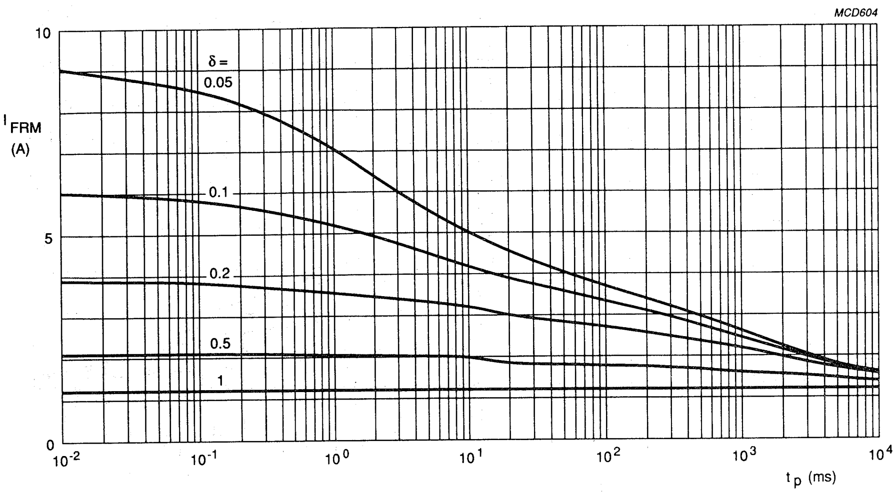
Fig.12 Maximum average forward current as a function of ambient temperature (including losses due to reverse leakage).



BYD73A to D.

T_{tp} = 55 °C; $R_{th\ j\text{-}tp}$ = 60 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

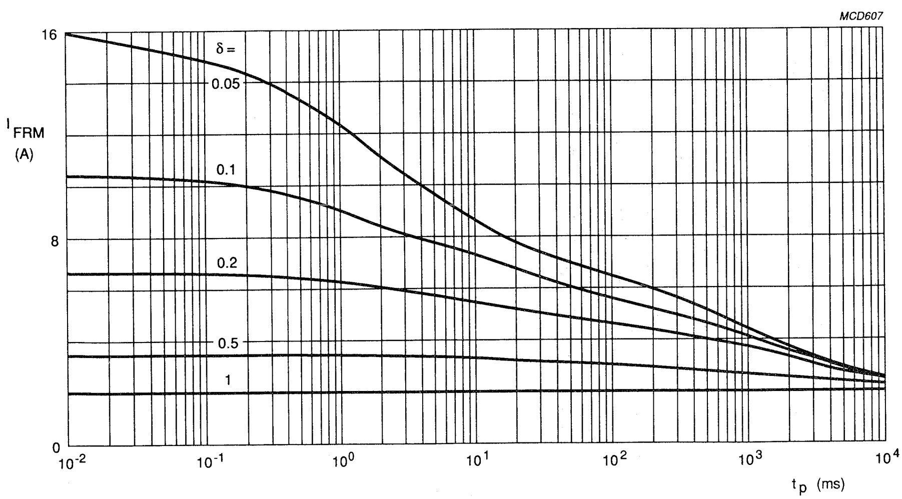
Fig.13 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



BYD73A to D.

T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 120 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

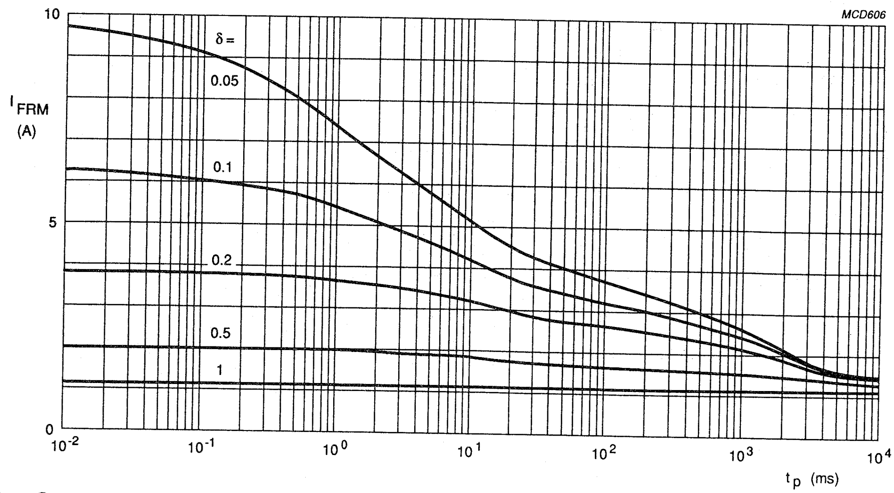
Fig.14 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



BYD73E to G.

T_{tp} = 55 °C; $R_{th\ j\text{-}tp}$ = 60 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

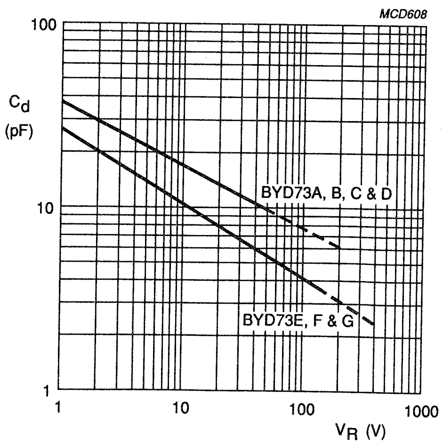
Fig.15 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



BYD73E to G.

T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 120 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

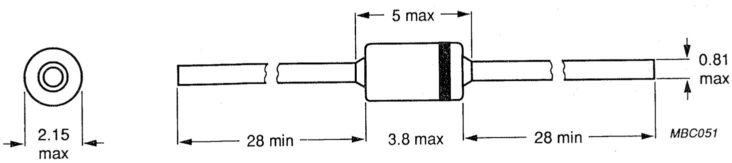
Fig.16 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



f = 1 MHz; T_j = 25 °C.

Fig.17 Diode capacitance as a function of reverse voltage, typical values.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.18 SOD81.

EPITAXIAL AVALANCHE DIODES

Glass passivated 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.

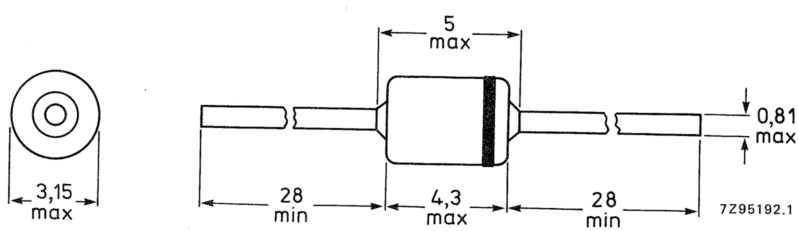
QUICK REFERENCE DATA

			BDY74A	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.	2,4	2,4	2,4	2,4	2,15	2,15	2,15	A
Non-repetitive peak forward current	I_{FSM}	max.	50	50	50	50	50	50	50	A
Non-repetitive peak reverse energy	E_{RSM}	max.	40	40	40	40	40	40	40	mJ
Reverse recovery time	t_{rr}	<	25	25	25	25	50	50	50	ns

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-84.



The marking band indicates the cathode.

* Implosion diode.

RATINGS

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

			BYD74A	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.	2,4	2,4	2,4	2,4	2,15	2,15	2,15	A
T_{amb} = 60 °C; Fig. 2	$I_{F(AV)}$	max.	1,35	1,35	1,35	1,35	1,2	1,2	1,2	A
Repetitive peak forward current										
T_{tp} = 55 °C; see Figs 11 and 13	I_{FRM}	max.	21	21	21	21	21	21	21	A
T_{amb} = 60 °C; see Figs 12 and 14	I_{FRM}	max.	13	13	13	13	12	12	12	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; with inductive load switched-off: I_R = 820 mA at T_j = 25 °C prior to surge	E_{RSM}	max.	40	mJ
I_R = 580 mA at $T_j = T_{j\,max}$ 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	$R_{th\,j\text{-}tp}$	=	50	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")	$R_{th\,j\text{-}a}$	=	105	K/W

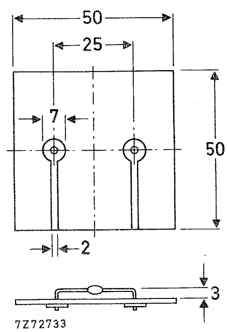
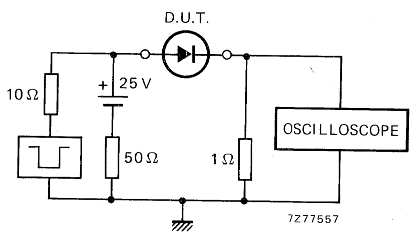


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYD74A	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 = 2 A; $T_j = T_{j\,max}$	V_F	<	0,72	0,72	0,72	0,72	0,82	0,82	0,82	V
I_F = 2 A	V_F	<	0,94	0,94	0,94	0,94	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	<	150	150	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}	<	25	25	25	25	50	50	50	ns



Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ⩽ 7 ns.
Source impedance 50 Ω. Rise time ⩽ 15 ns.

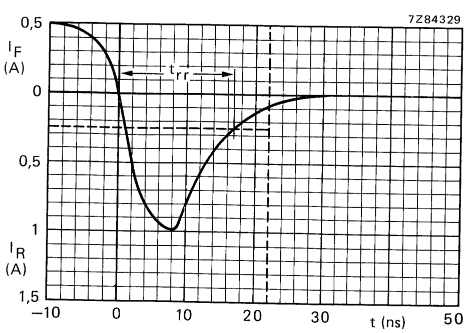


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

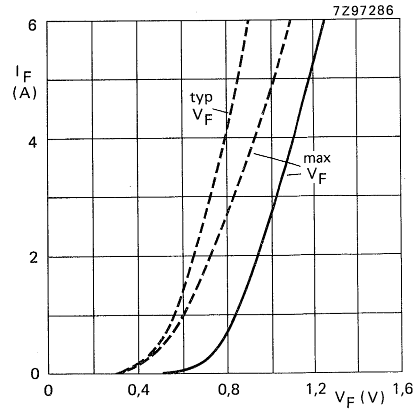


Fig. 5 **BYD74A; B; C; D.** Forward voltage;
——— $T_j = 25\ ^oC$; – – – $T_j = T_{j\ max}$.

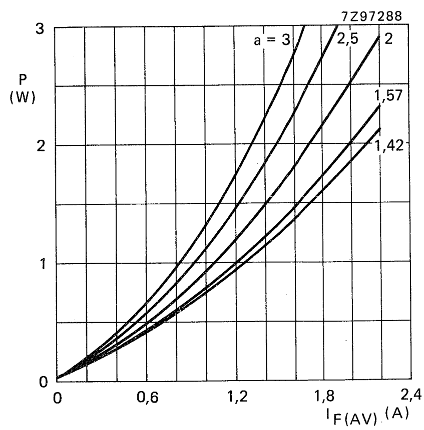


Fig. 6 **BYD74A; B; C; D.** Maximum values steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$, $\delta = 0{,}5$.

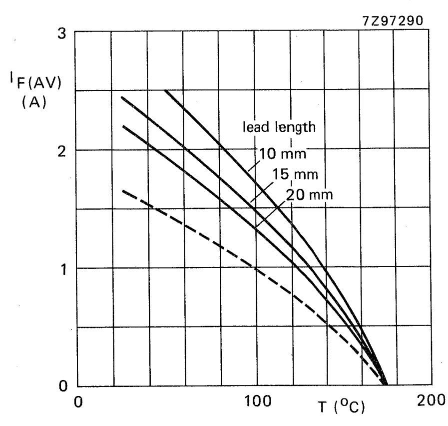


Fig. 7 **BYD74A; B; C; D.** Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application.

$V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

– – – = ambient temperature and device mounted as shown in Fig. 2

——— = tie-point temperature

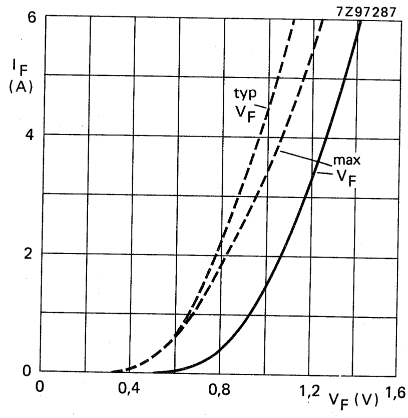


Fig. 8 **BYD74E; F; G.** Forward voltage; —— T_j = 25 °C; – – – $T_j = T_{j\ max}$.

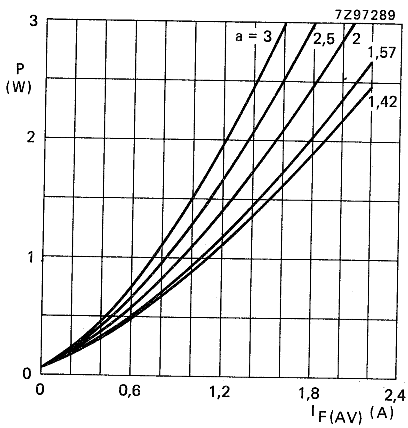


Fig. 9 **BYD74E; F; G.** Maximum values steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$, $\delta = 0{,}5$.

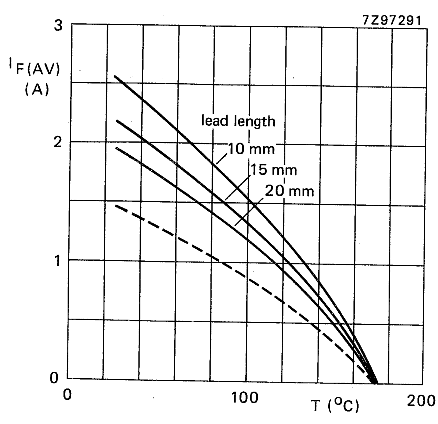


Fig. 10 **BYD74E; F; G.** Maximum average forward current as a function of temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application.

$V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

– – – = ambient temperature and device mounted as shown in Fig. 2

—— = tie-point temperature

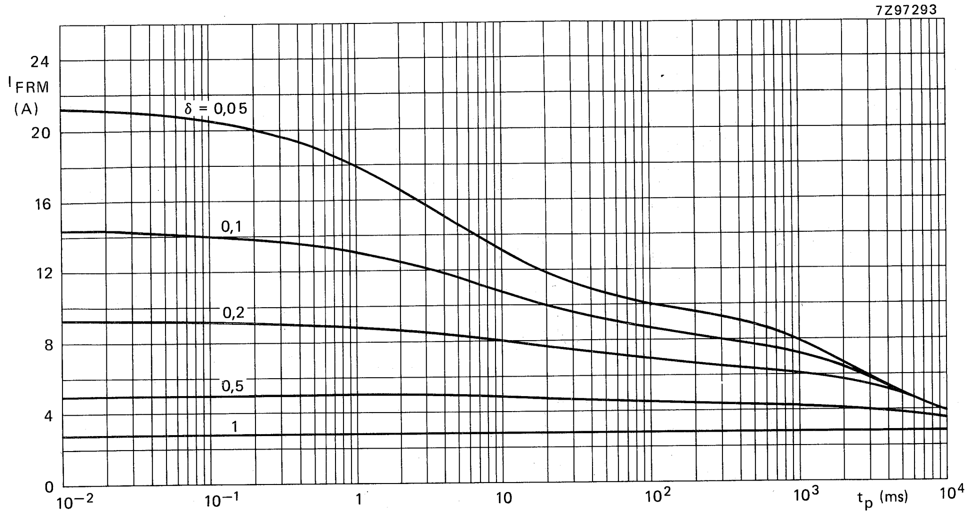


Fig. 11 **BYD74A; B; C; D.** Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 50 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 200 V.

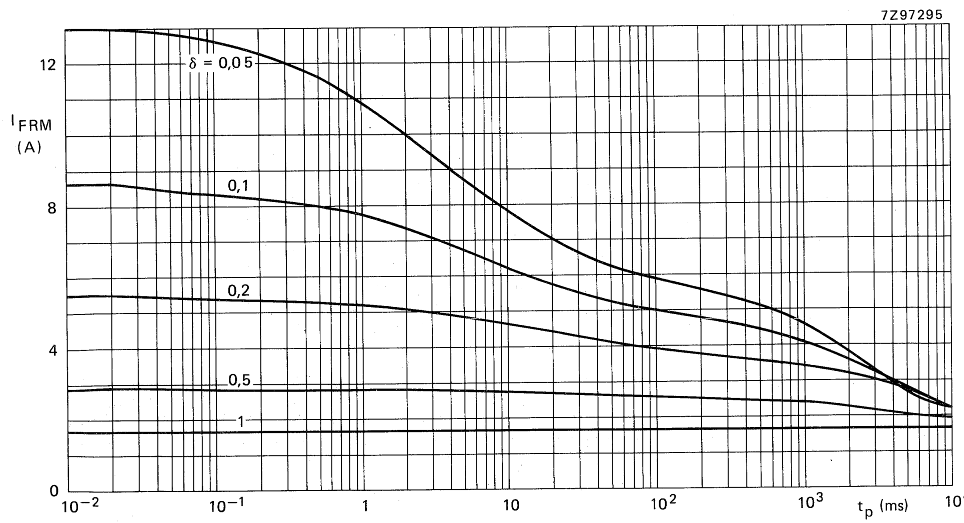


Fig. 12 **BYD74A; B; C; D.** Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 105 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 200 V.

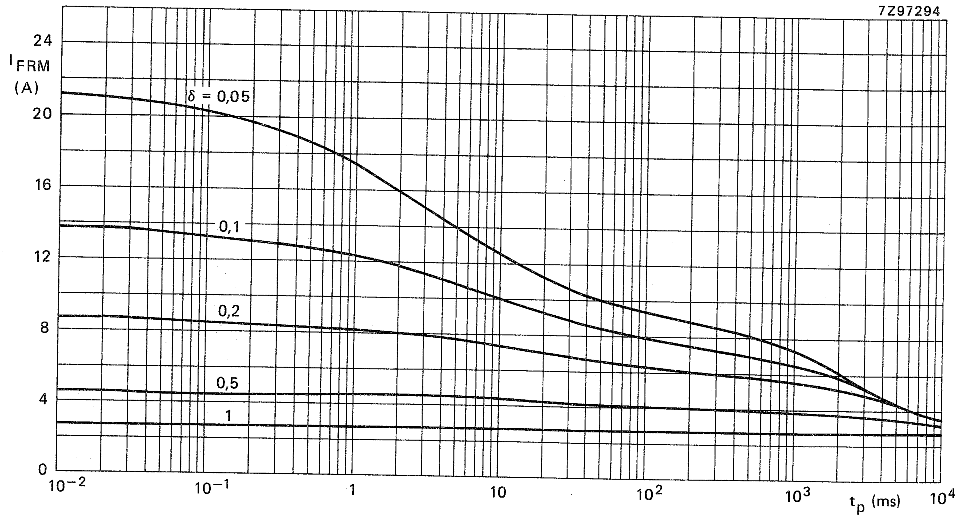


Fig. 13 **BYD74E; F; G.** Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 50 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 400 V.

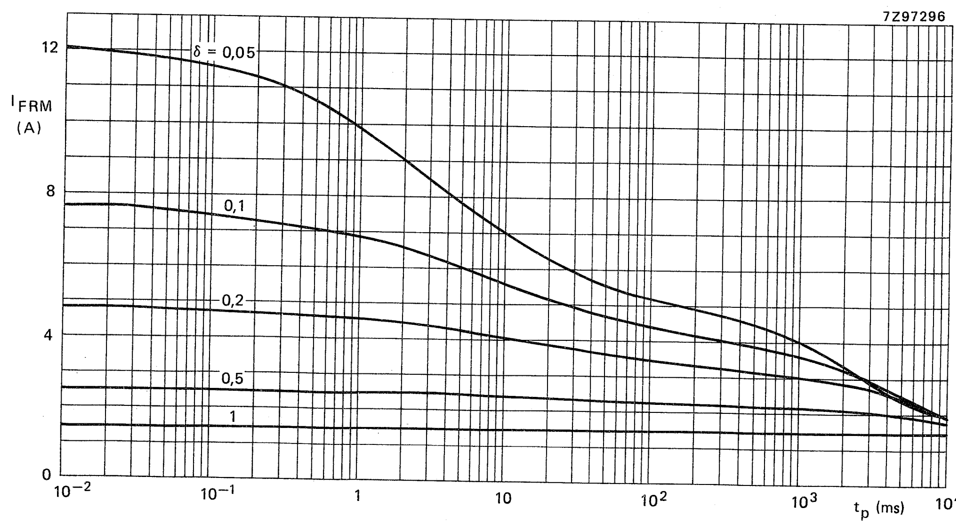


Fig. 14 **BYD74E; F; G.** Maximum repetitive peak forward current as a function of the pulse time (square pulse) and duty-factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 105 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 400 V.

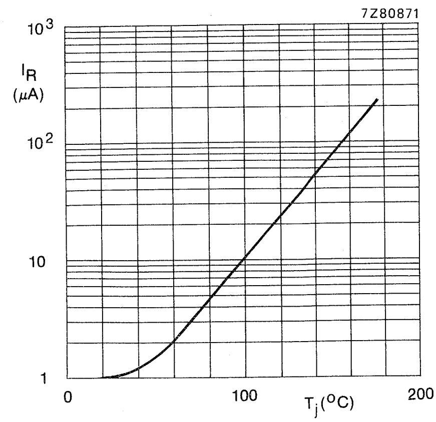


Fig. 15 Maximum values reverse current as a function of junction temperature; $V_R = V_{RRMmax}$.

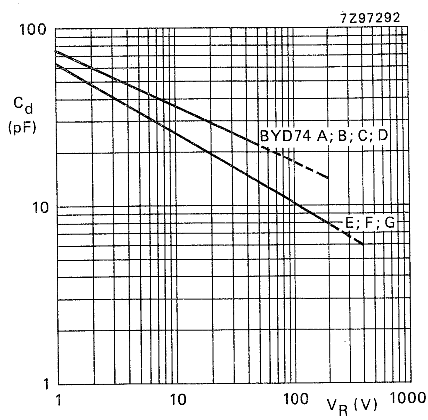


Fig. 16 Capacitance as a function of reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

Epitaxial avalanche diodes BYD77 series

DESCRIPTION

Rectifier diodes in hermetically sealed leadless SMID (surface mounted implosion diode) 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 (SMPS) and in general high frequency circuits, where low conduction and switching losses are essential.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_R	continuous reverse voltage		
	BYD77A	50	V
	BYD77B	100	V
	BYD77C	150	V
	BYD77D	200	V
	BYD77E	250	V
	BYD77F	300	V
	BYD77G	400	V
V_{RRM}	repetitive peak reverse voltage		
	BYD77A	50	V
	BYD77B	100	V
	BYD77C	150	V
	BYD77D	200	V
	BYD77E	250	V
	BYD77F	300	V
	BYD77G	400	V
$I_{F(AV)}$	average forward current	1.85	A
I_{FSM}	non-repetitive peak forward current	25	A
E_{RSM}	non-repetitive peak reverse energy	20	mJ
t_{rr}	reverse recovery time		
	BYD77A to D	25	ns
	BYD77E to G	50	ns

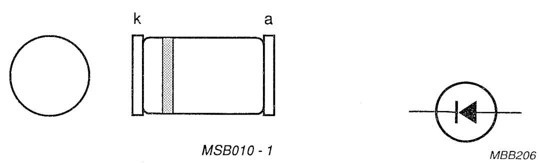


Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage				
	BYD77A		–	50	V
	BYD77B		–	100	V
	BYD77C		–	150	V
	BYD77D		–	200	V
	BYD77E		–	250	V
	BYD77F		–	300	V
	BYD77G		–	400	V
V_R	continuous reverse voltage				
	BYD77A		–	50	V
	BYD77B		–	100	V
	BYD77C		–	150	V
	BYD77D		–	200	V
	BYD77E		–	250	V
	BYD77F		–	300	V
	BYD77G		–	400	V
$I_{F(AV)}$	average forward current	square wave; $\delta = 0.5$; $T_{tp} = 105$ °C	–	1.85	A
		$T_{amb} = 60$ °C; see Fig.2			
	BYD77A to D		–	0.85	A
	BYD77E to G		–	0.8	A
I_{FRM}	repetitive peak forward current				
	BYD77A to D		–	15	A
	BYD77E to G		–	13	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge; with reapplied V_{RRM}	–	25	A
E_{RSM}	non-repetitive peak reverse avalanche energy	$I_R = 600$ mA; $T_j = 25$ °C prior to surge; with inductive load switched off	–	20	mJ
		$I_R = 400$ mA; $T_j = T_{j\,max}$ prior to surge; with inductive load switched off	–	10	mJ
T_{stg}	storage temperature range		–65	175	°C
T_j	junction temperature		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tiepoint		30 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	150 K/W

Note

1. Device mounted on an epoxy-glass printed circuit board, 1.5 mm thick; thickness of copper ≤ 40 μm, see Fig.2.

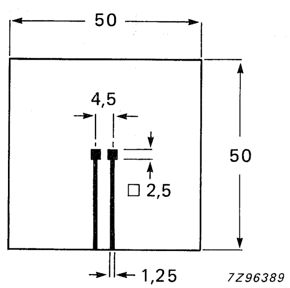


Fig.2 Device mounted on a printed circuit board.

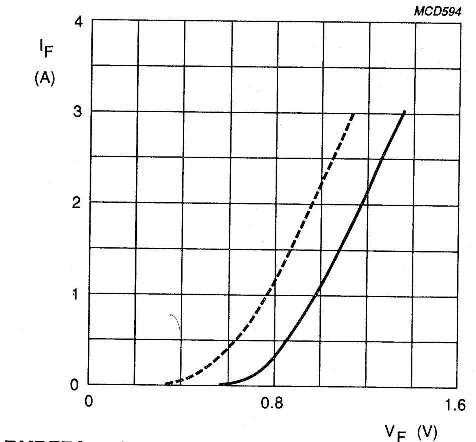
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 1 A; $T_j = T_{j\ max}$; note 1			
	BYD77A to D		–	0.75	V
	BYD77E to G		–	0.83	V
		I_F = 1 A; note 1			
	BYD77A to D		–	0.98	V
	BYD77E to G		–	1.05	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 0.1 mA			
	BYD77A		55	–	V
	BYD77B		110	–	V
	BYD77C		165	–	V
	BYD77D		220	–	V
	BYD77E		275	–	V
	BYD77F		330	–	V
	BYD77G		440	–	V
I_R	reverse current	$V_R = V_{RRM\ max}$	–	1	μA
		$V_R = V_{RRM\ max}$; T_j = 165 °C	–	100	μA
t_{rr}	reverse recovery time	switched from I_F = 0.5 A to I_R = 1 A; measured at I_R = 0.25 A			
	BYD77A to D		–	25	ns
	BYD77E to F		–	50	ns

Note

1. Measured under pulse conditions to avoid excessive dissipation.

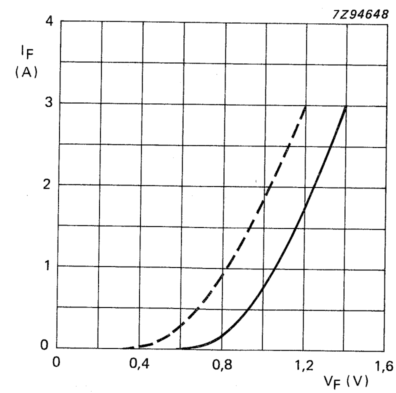


BYD77A to D.

Solid line: T_j = 25 °C.

Dotted line: T_j = 175 °C.

Fig.3 Forward current as a function of forward voltage.

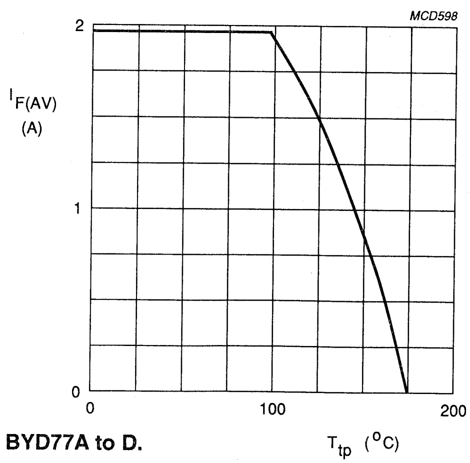


BYD77E to G.

Solid line: T_j = 25 °C.

Dotted line: T_j = 175 °C.

Fig.4 Forward current as a function of forward voltage.

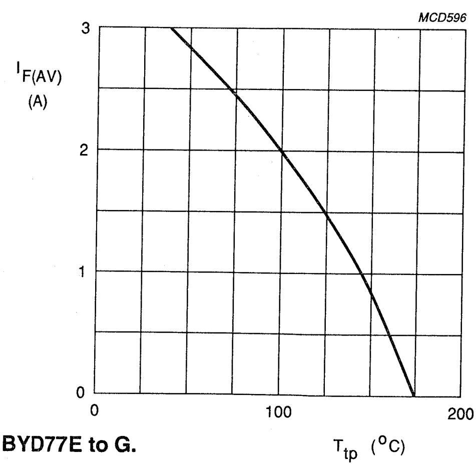


BYD77A to D.

$V_R = V_{RRM\ max}$; square-wave current, a = 1.42.

Pulsed reverse voltage, $\delta = 0.5$.

Fig.5 Maximum average forward current as a function of tie-point temperature (including losses due to reverse leakage).

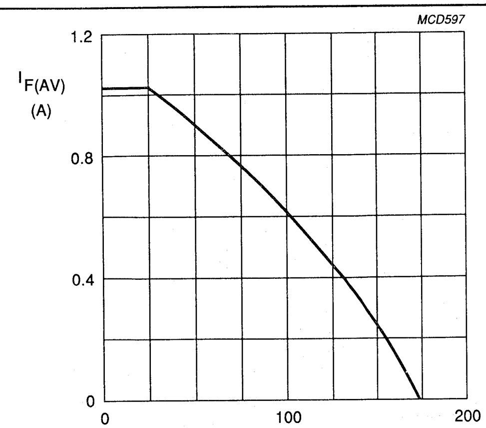


BYD77E to G.

$V_R = V_{RRM\ max}$; square-wave current, a = 1.42.

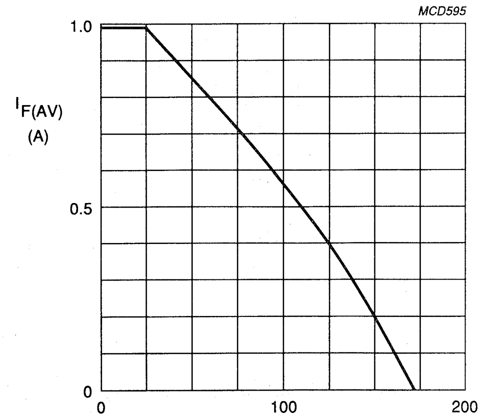
Pulsed reverse voltage, $\delta = 0.5$.

Fig.6 Maximum average forward current as a function of tie-point temperature (including losses due to reverse leakage).



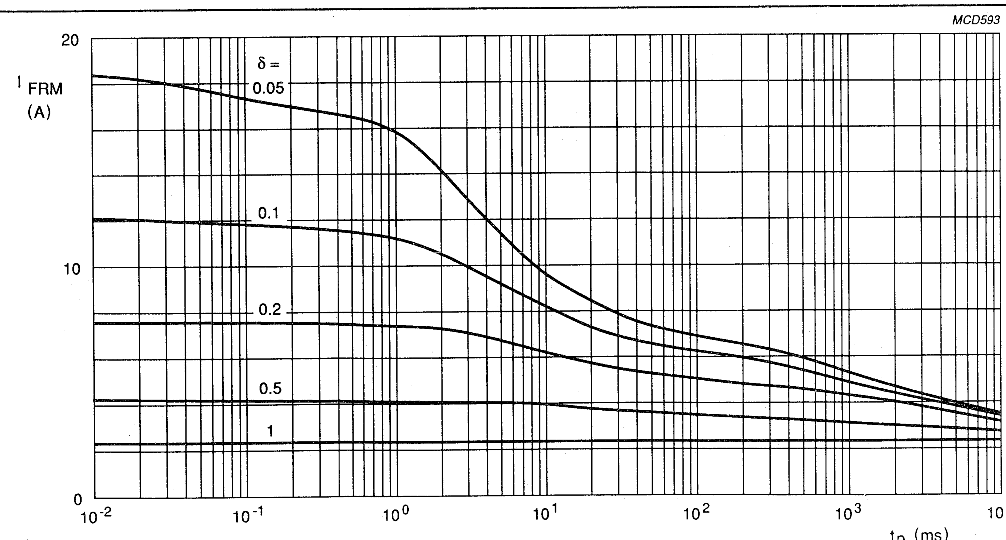
BYD77A to D.
$V_R = V_{RRM\ max}$; square-wave current, a = 1.42.
Pulsed reverse voltage, δ = 0.5.

Fig.7 Maximum average forward current as a function of ambient temperature (including losses due to reverse leakage).



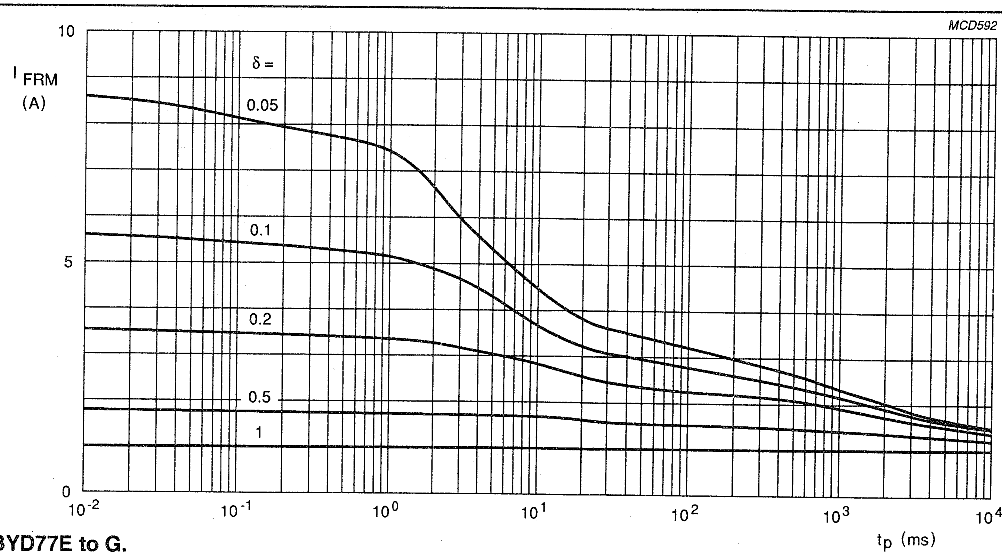
BYD77E to G.
$V_R = V_{RRM\ max}$; square-wave current, a = 1.42.
Pulsed reverse voltage, δ = 0.5.

Fig.8 Maximum average forward current as a function of ambient temperature (including losses due to reverse leakage).



BYD77A to D.
δ at T_{tp} = 105 °C; $R_{th\ j\text{-}tp}$ = 30 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

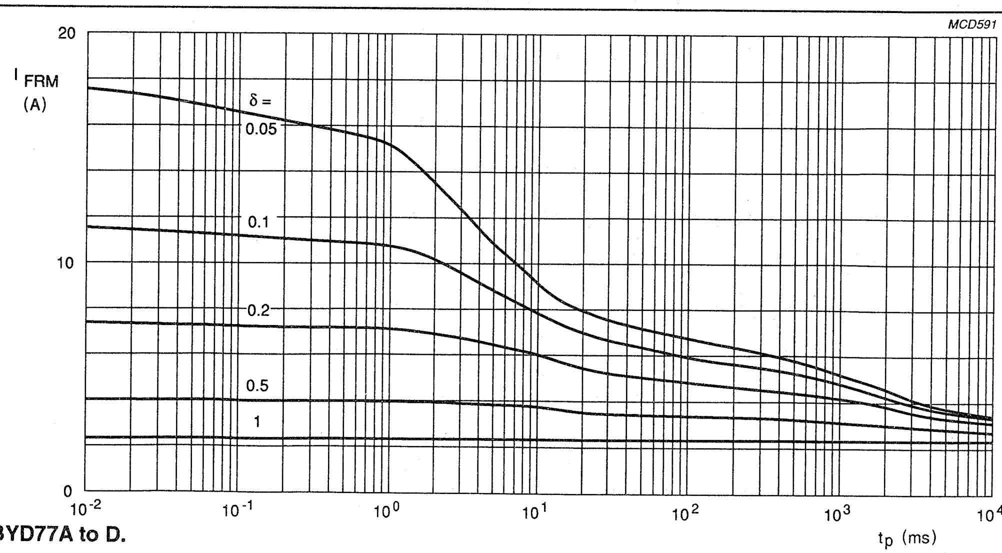
Fig.9 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



BYD77E to G.

δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 150 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

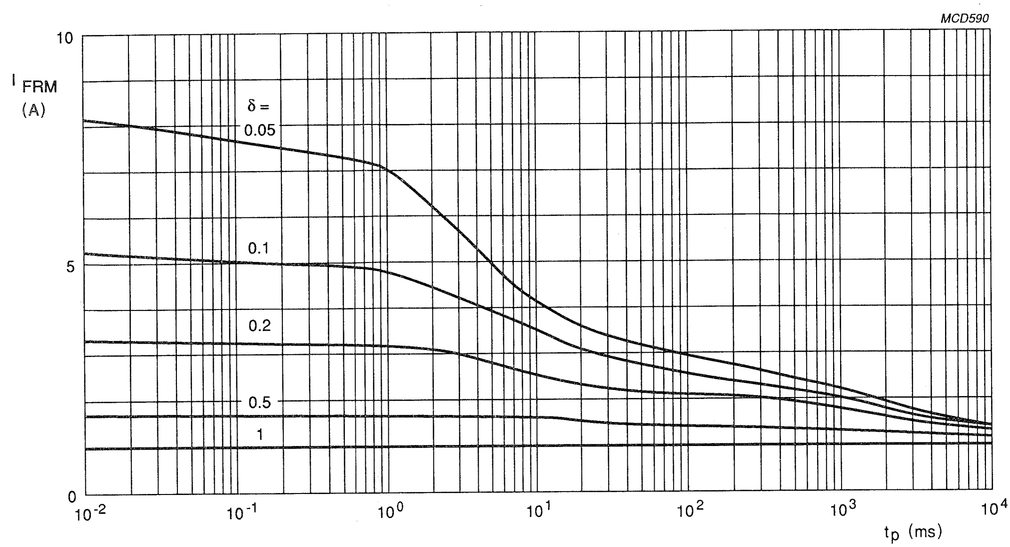
Fig.10 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).



BYD77A to D.

δ at T_{tp} = 105 °C; $R_{th\ j\text{-}tp}$ = 30 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

Fig.11 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).

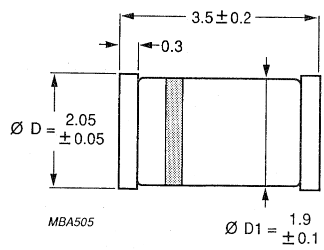


BYD77E to G.

δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 150 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at $V_R = V_{RRM\ max}$.

Fig.12 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor (δ).

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.13 SOD87.

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.

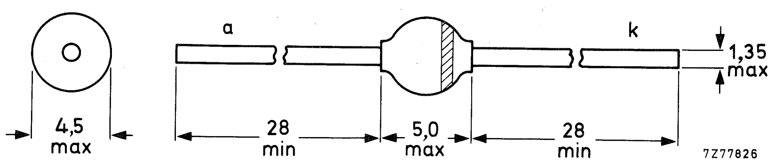
QUICK REFERENCE DATA

			BYM26A	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.	2,3	2,3	2,3	2,3	2,3	A
Non-repetitive peak forward current	I_{FSM}	max.	45	45	45	45	45	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-64.



The marking band indicates the cathode.

RATINGS

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

			BYM26A	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} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.	2,3					A
T_{amb} = 65 °C; see Fig. 2	$I_{F(AV)}$	max.	1					A
Repetitive peak forward current T_{tp} = 55 °C; see Fig. 10	I_{FRM}	max.	19					A
T_{amb} = 65 °C; see Fig. 11	I_{FRM}	max.	8					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.	45					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	$R_{th\,j\text{-}tp}$	=	25	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")	$R_{th\,j\text{-}a}$	=	75	K/W

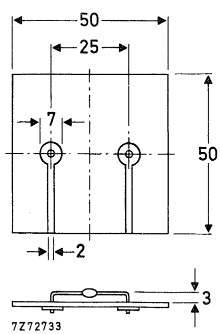


Fig. 2 Device mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYM26A	B	C	D	E	
Forward voltage*								
I_F = 2 A; T_j = 175 °C	V_F	<	1,34	1,34	1,34	1,34	1,34	V
I_F = 2 A	V_F	<	2,65	2,65	2,65	2,65	2,65	V
Reverse avalanche breakdown voltage								
I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	900	1100	V
Reverse current								
$V_R = V_{RRM\,max}$	I_R	<	10	10	10	10	10	μA
$V_R = V_{RRM\,max}$; 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

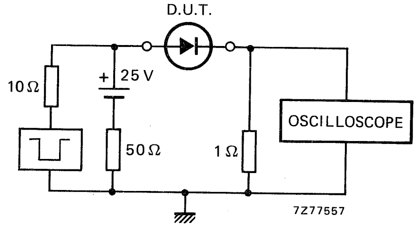


Fig. 3 Test circuit.

Input impedance oscilloscope: 1 MΩ, 22 pF; rise time < 7 ns

Source impedance: 50 Ω; rise time < 15 ns

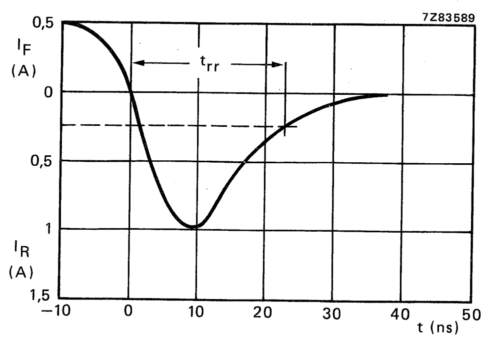


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

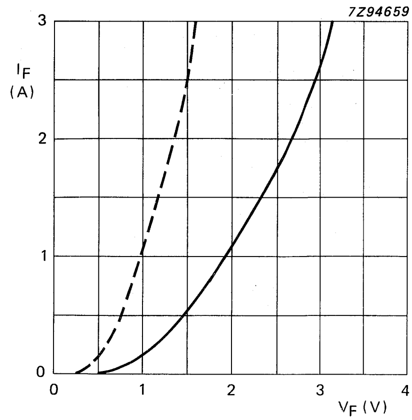


Fig. 5 Maximum forward voltage at
—— T_j = 25 °C; – – – T_j = 175 °C.

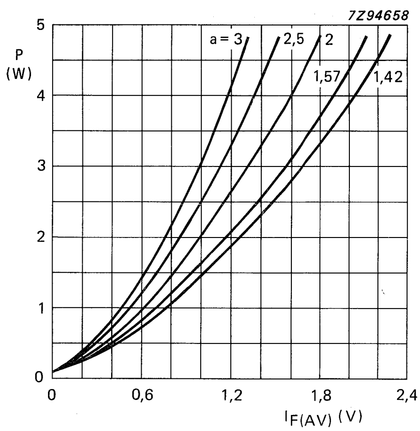


Fig. 6 Maximum steady state power dissipation (forward plus leakage current) excluding switching losses versus average forward current.

The graph is for switched-mode application. a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\,max}$, δ = 0,5.

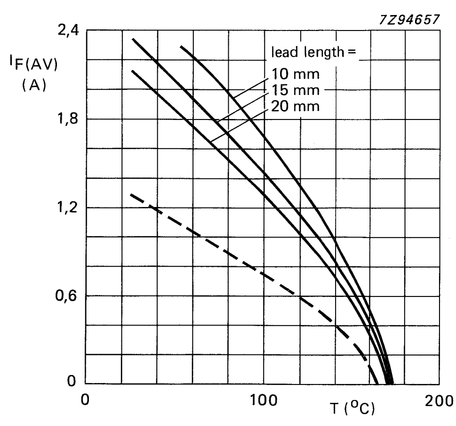


Fig. 7 Maximum average forward current vs. temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application. $V_R = V_{RRM\,max}$, δ = 0,5; a = 1,42.

—— tie-point temperature

– – – ambient temperature; mounting method see Fig. 2.

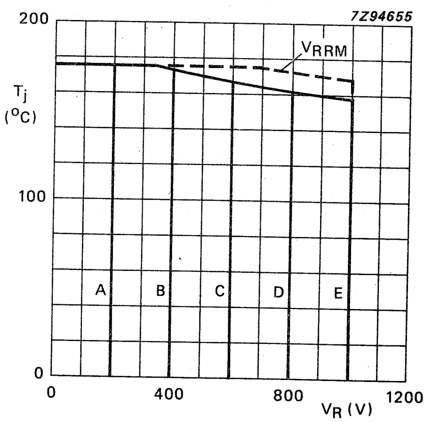


Fig. 8 Maximum permissible junction temperature versus applied reverse voltage.

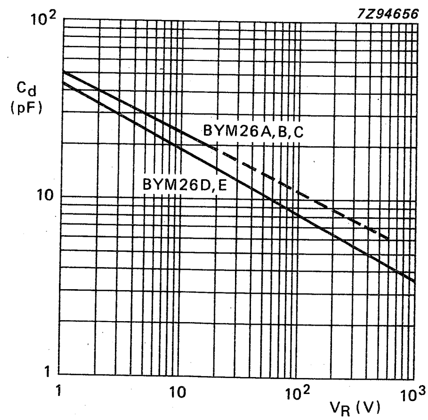


Fig. 9 Capacitance versus reverse voltage; f = 1 MHz; T_j = 25 °C; typical values.

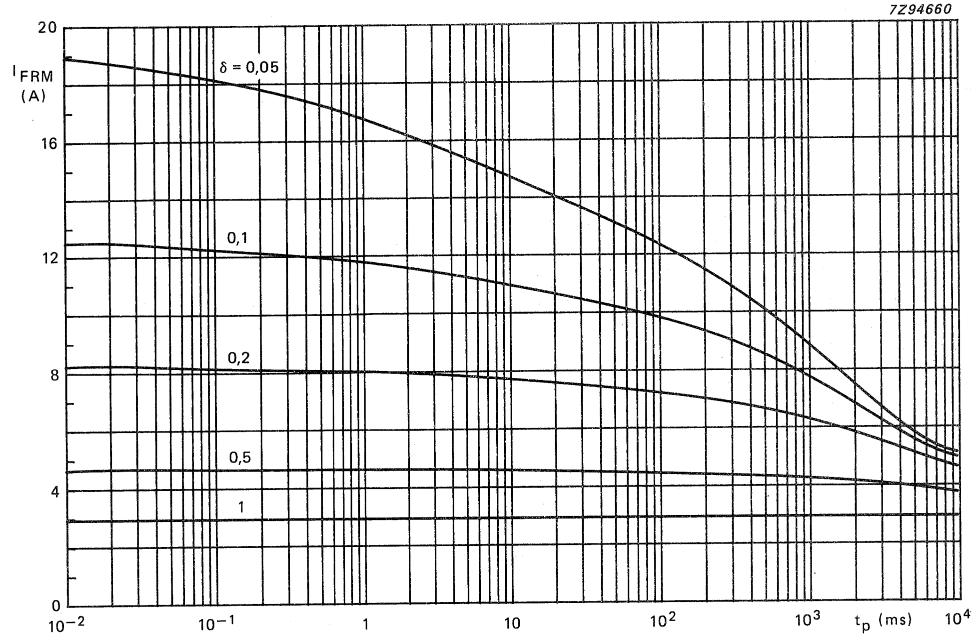


Fig. 10 Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 25 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

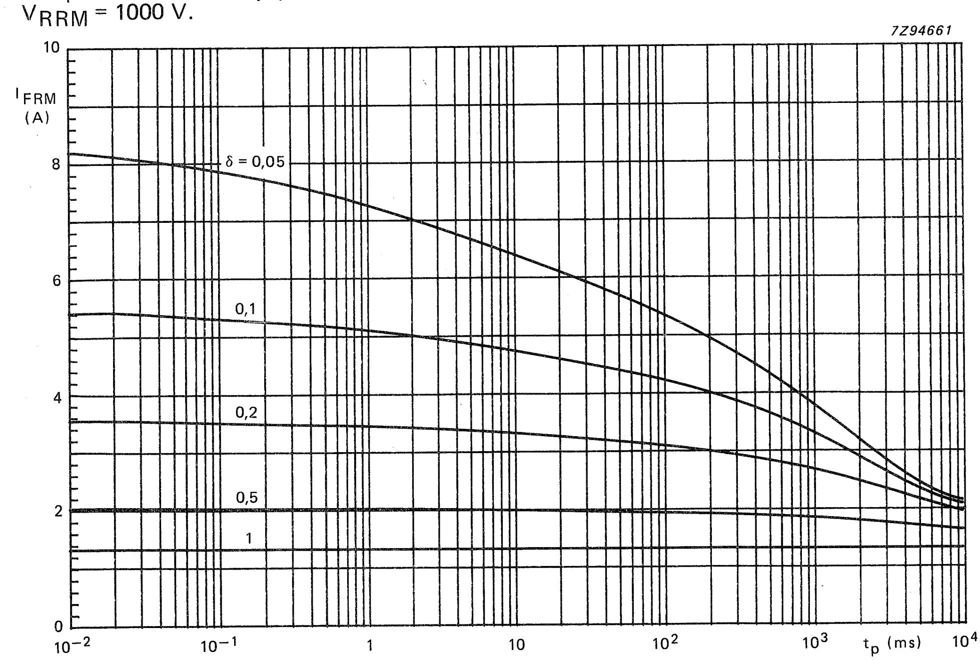


Fig. 11 Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 65 °C; $R_{th\ j\text{-}tp}$ = 75 K/W; V_{RRM} during 1 – δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

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.

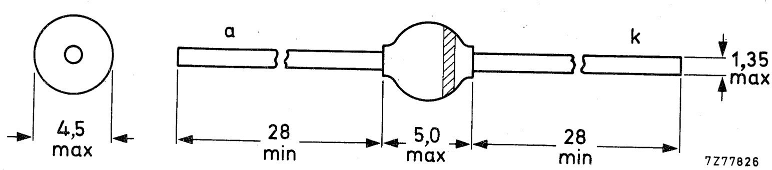
QUICK REFERENCE DATA

			BYM36A	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.	3	3	3	2,9	2,9	A
Non-repetitive peak forward current	I_{FSM}	max.	65	65	65	65	65	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-64.



The marking band indicates the cathode.

RATINGS

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

			BYM36A	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} = 55 °C; lead length 10 mm	$I_{F(AV)}$	max.	3	3	3	2,9	2,9	A
T_{amb} = 65 °C; see Fig. 2	$I_{F(AV)}$	max.	1,25	1,25	1,25	1,2	1,2	A
Repetitive peak forward current T_{tp} = 55 °C; see Figs 10, 11	I_{FRM}	max.	37	37	37	33	33	A
T_{amb} = 65 °C; see Figs 12, 13	I_{FRM}	max.	13	13	13	11	11	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.			65			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 — $R_{th\,j\text{-}tp}$ = 25 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") — $R_{th\,j\text{-}a}$ = 75 K/W

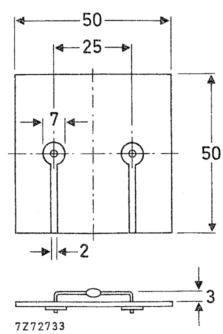


Fig. 2 Device mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			BYM36A	B	C	D	E
Forward voltage*							
I_F = 3 A; T_j = 175 °C	V_F	<	1,22	1,22	1,22	1,28	1,28 V
I_F = 3 A	V_F	<	1,6	1,6	1,6	1,78	1,78 V
Reverse avalanche breakdown voltage I_R = 0,1 mA	$V_{(BR)R}$	>	300	500	700	900	1100 V
Reverse current							
$V_R = V_{RRM\,max}$	I_R	<	5	5	5	5	5 μA
$V_R = V_{RRM\,max}$; 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

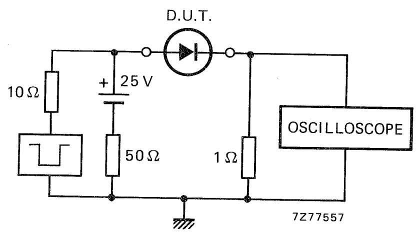


Fig. 3 Test circuit.

Input impedance oscilloscope: 1 MΩ, 22 pF; rise time < 7 ns

Source impedance: 50 Ω; rise time < 15 ns

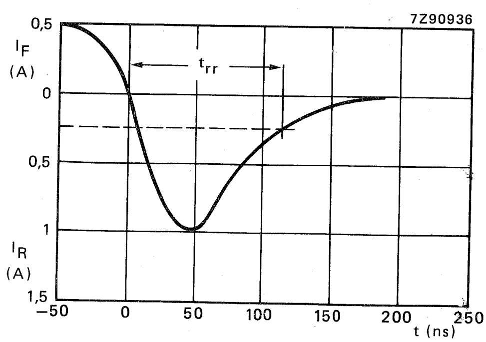


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

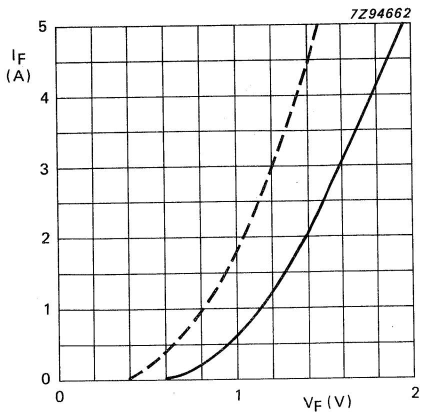


Fig. 5a **BYM36A; B; C.**
Maximum forward voltage at
——— T_j = 25 °C;
– – – T_j = 175 °C.

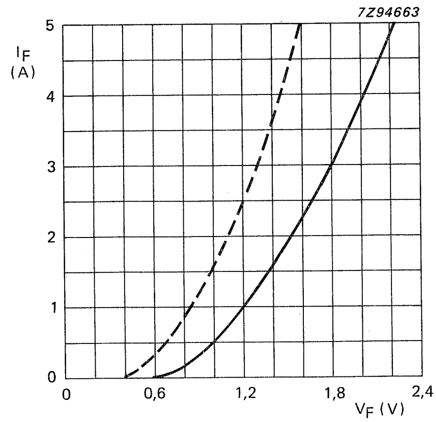


Fig. 5b **BYM36D; E.**
Maximum forward voltage at
——— T_j = 25 °C;
– – – T_j = 175 °C.

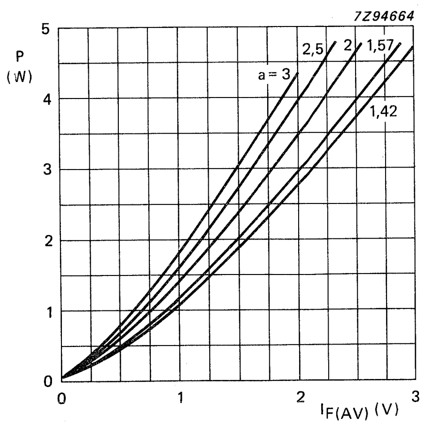


Fig. 6a **BYM36A; B; C.**

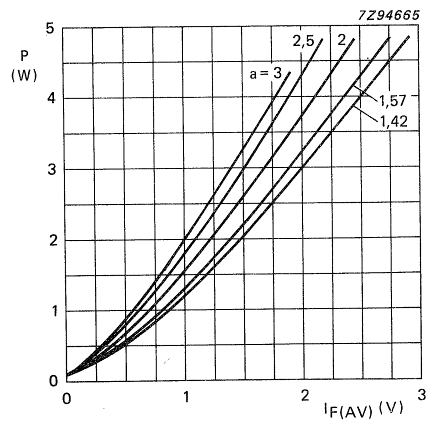


Fig. 6b **BYM36B; C.**

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 = $I_{F(RMS)}/I_{F(AV)}$;
$V_R = V_{RRM\,max}$, $\delta = 0{,}5$.

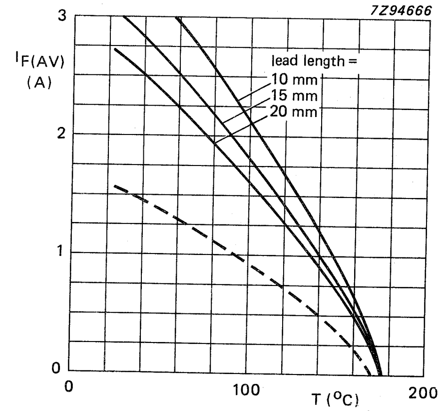


Fig. 7a **BYM36A; B; C.**

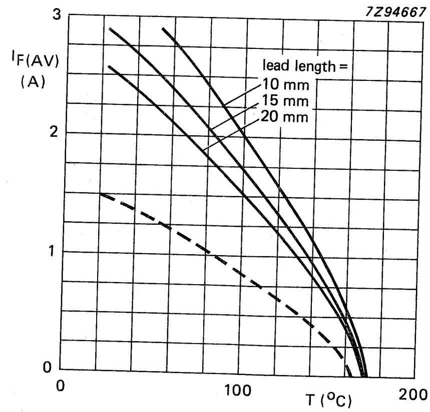


Fig. 7b **BYM36D; E.**

Conditions for Figs 7a and 7b:

Maximum average forward current versus 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.

——— = tie-point temperature

– – – = ambient temperature and device mounted as in Fig. 2.

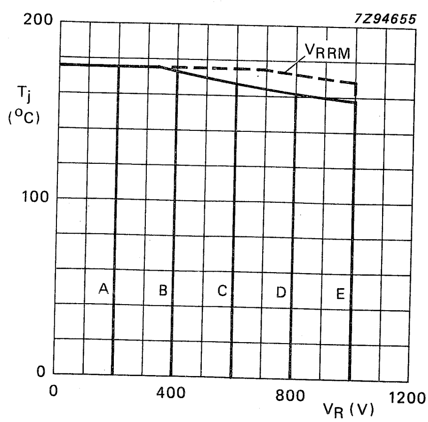


Fig. 8 Maximum permissible junction temperature versus applied reverse voltage.

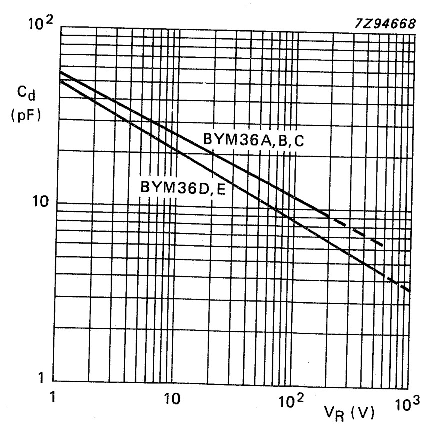


Fig. 9 Capacitance versus reverse voltage; f = 1 MHz; T_j = 25 ^oC; typical values.

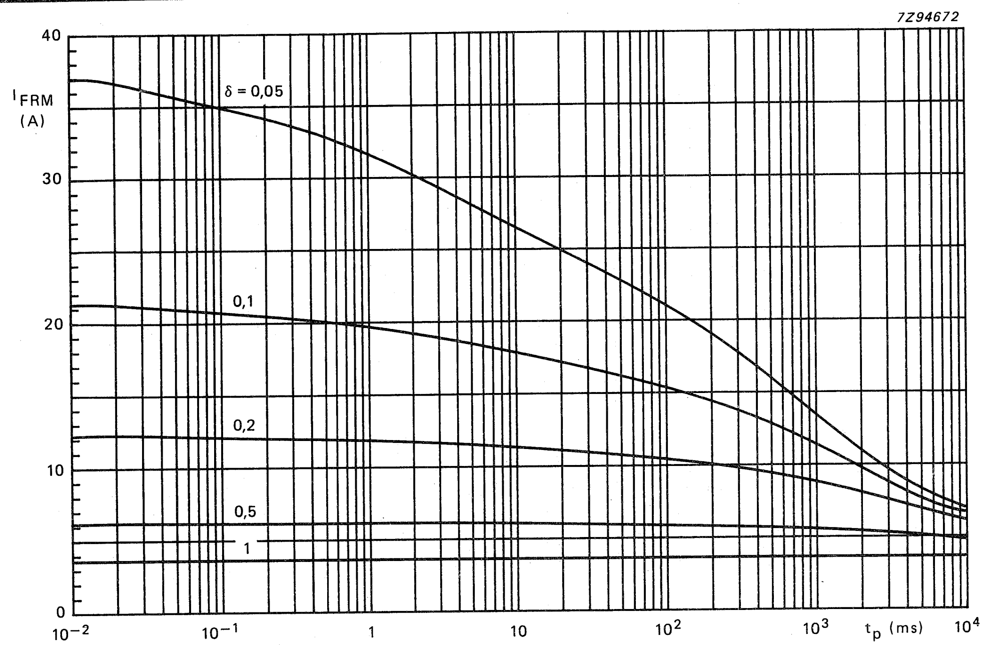


Fig. 10 **BYM36A; B; C.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 25 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

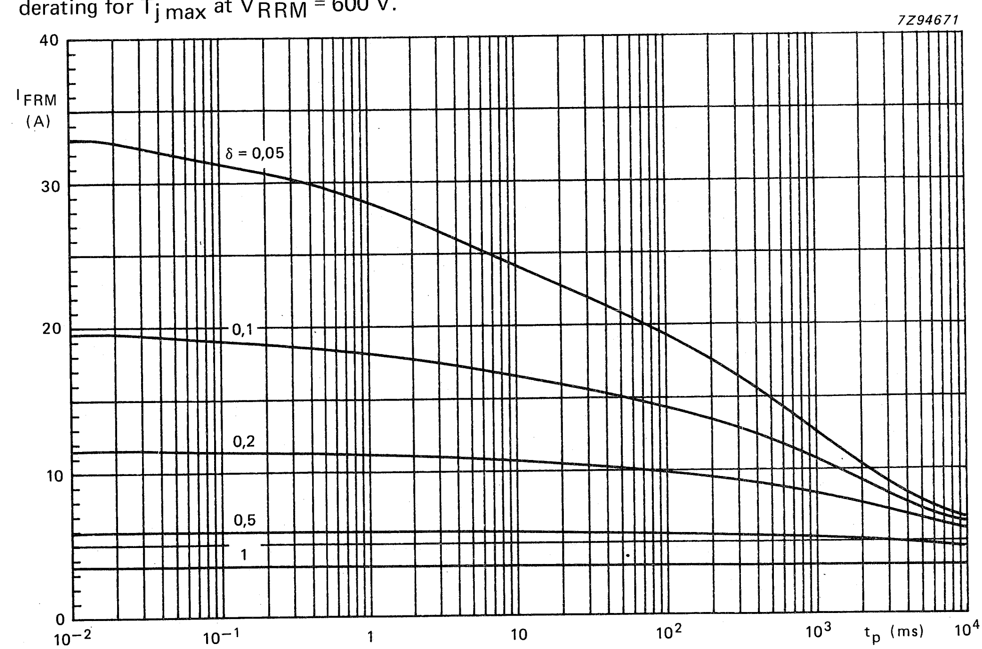


Fig. 11 **BYM36D; E.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at $T_{tie\text{-}point}$ = 55 °C; $R_{th\ j\text{-}tp}$ = 25 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

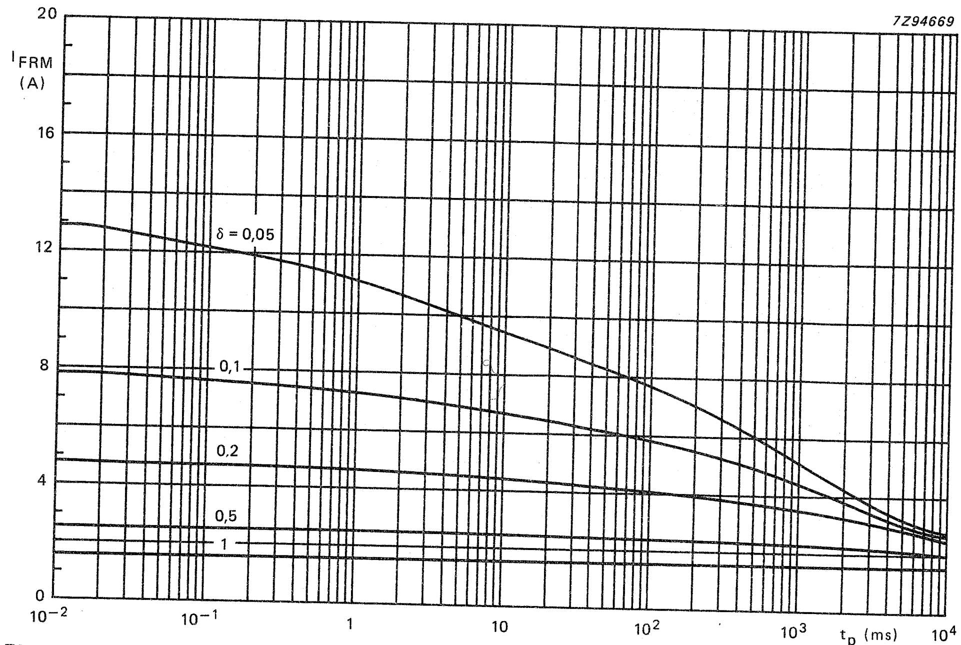


Fig. 12 **BYM36A; B; C.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 75 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

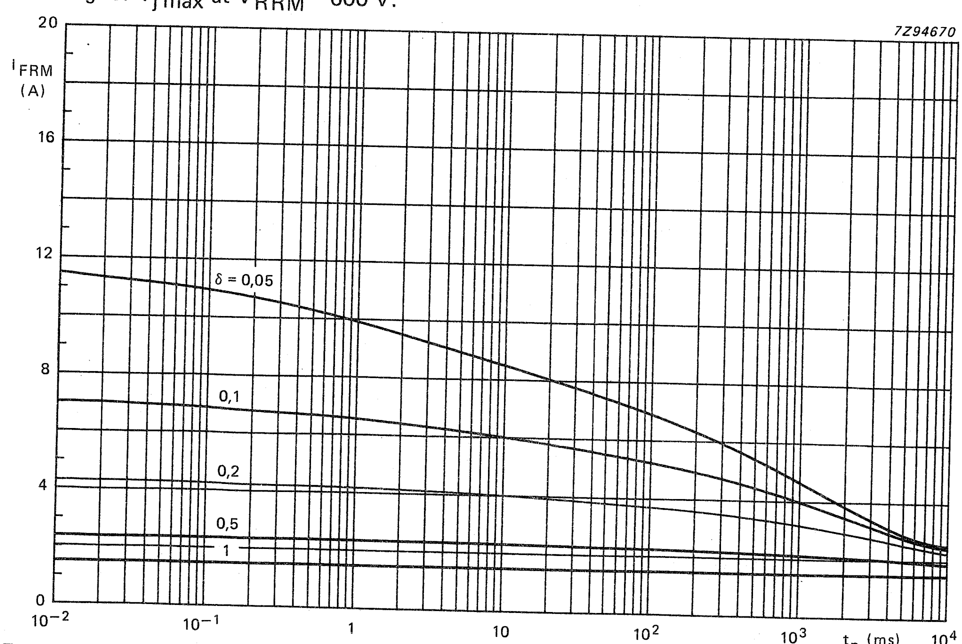


Fig. 13 **BYM36D; E.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty-factor δ at T_{amb} = 65 °C; $R_{th\ j\text{-}a}$ = 75 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

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.

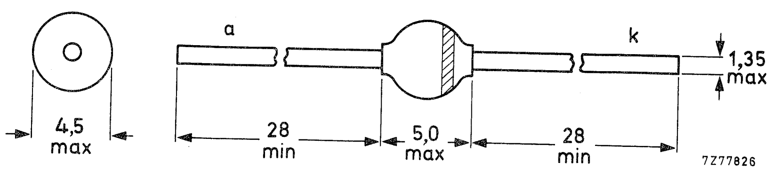
QUICK REFERENCE DATA

			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

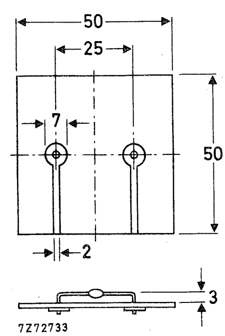


Fig. 2 Device mounted on a printed circuit board.

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%.

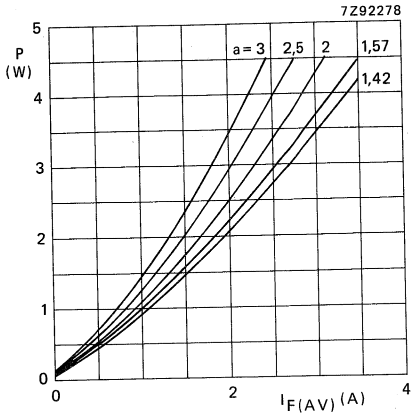


Fig. 3 Steady state power dissipation (forward plus leakage current) excluding losses in avalanche region as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; V_{RWMmax}.

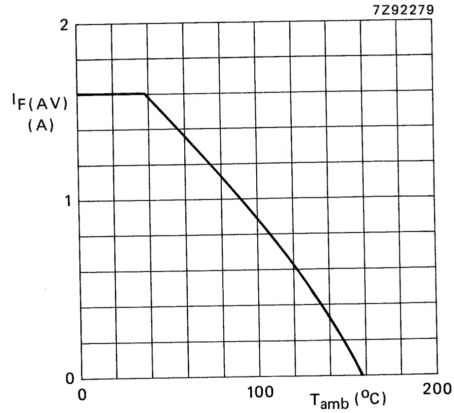


Fig. 4 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

$a = 1{,}57$; $V_R = V_{RWMmax}$.

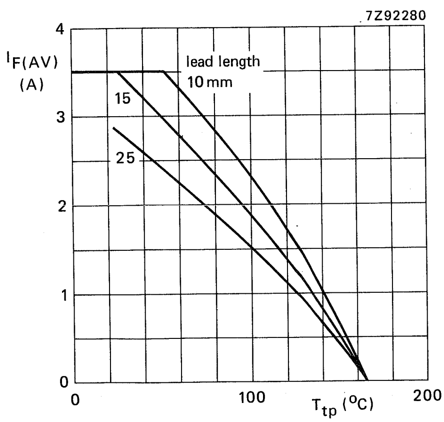


Fig. 5 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

$V_R = V_{RWMmax}$; $a = 1{,}57$.

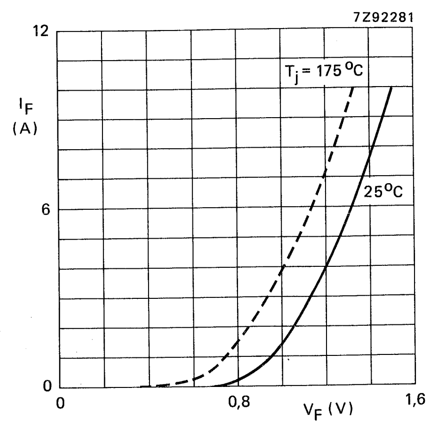


Fig. 6 Maximum V_F curves.

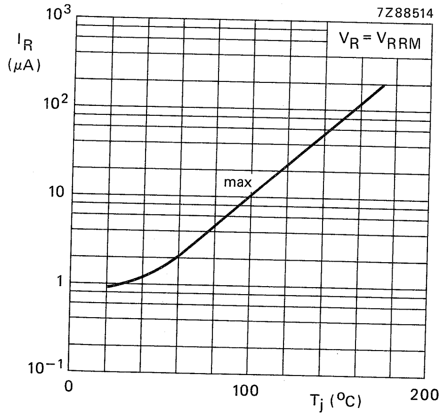


Fig. 7 I_R vs. T_j.

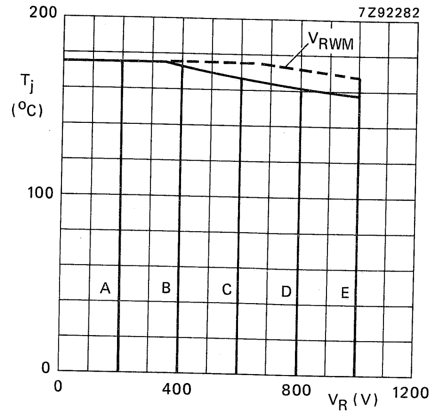


Fig. 8 Maximum values of T_j vs. V_R.

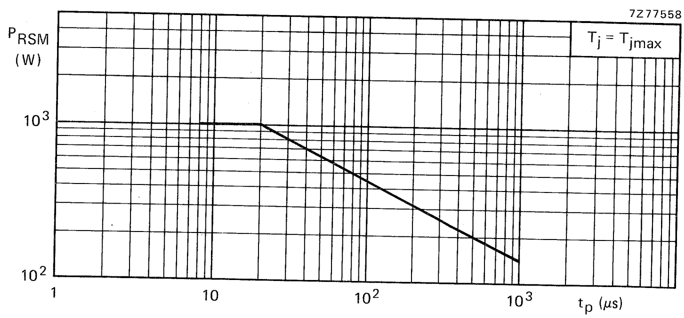
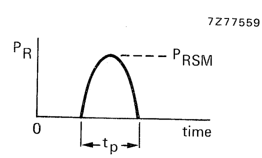


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



SCHOTTKY BARRIER DIODE

Schottky barrier diode with an integrated p-n junction protection ring in a SOD81 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.

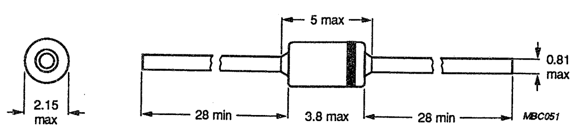
This diode is available in three reverse-voltage groups.

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 SOD81.

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

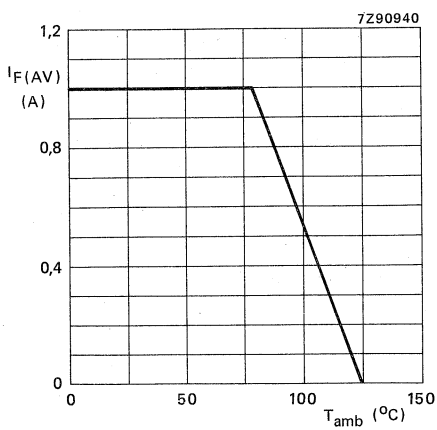


Fig. 2 Derating curve maximum ambient temperature.

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.

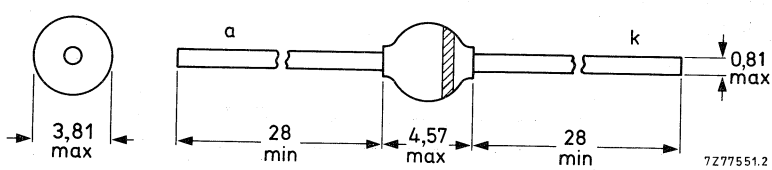
QUICK REFERENCE DATA

			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.	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}	<	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.	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	$R_{th\,j\text{-}a}$	=	100	K/W

(see "Thermal model")

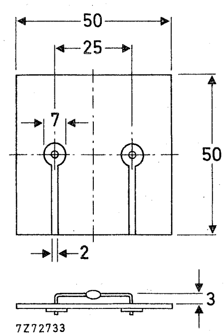


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			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	<	5	5	5	5	5 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

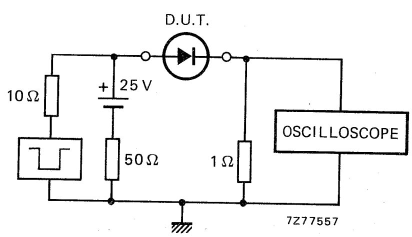


Fig. 3 Test circuit. Input impedance oscilloscope: 1 MΩ; 22 pF; rise time < 7 ns. Source impedance: 50 Ω; rise time < 15 ns.

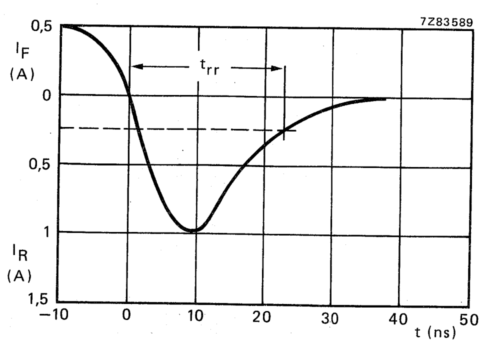


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

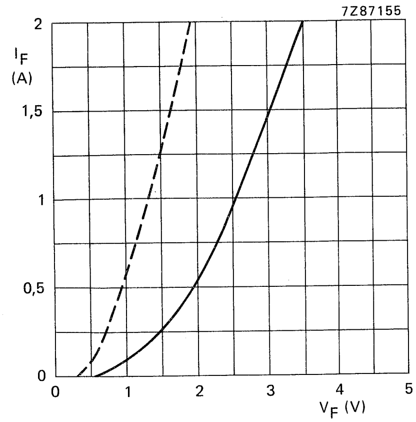
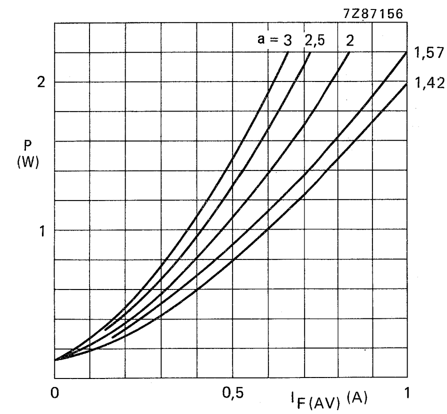


Fig. 5 Maximum forward voltage at
——— T_j = 25 °C
– – – T_j = 175 °C.



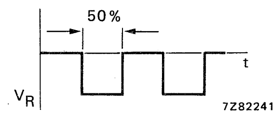


Fig. 6 Maximum steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$;

$V_R = V_{RRMmax}$, $\delta = 0{,}5$.

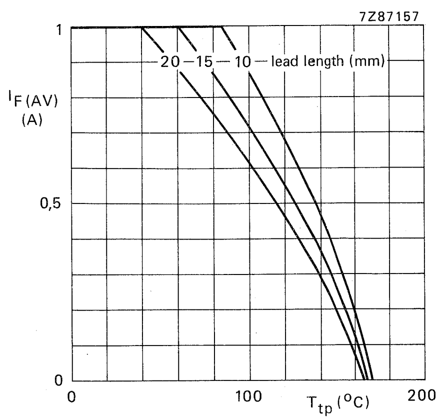


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application. $V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

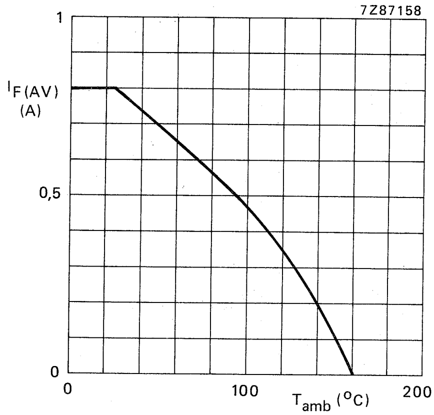


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2. The graph is for switched-mode application. $V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

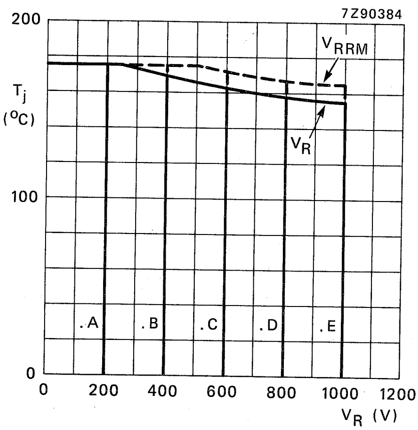


Fig. 9 Maximum permissible junction temperature as a function of the applied reverse voltage.

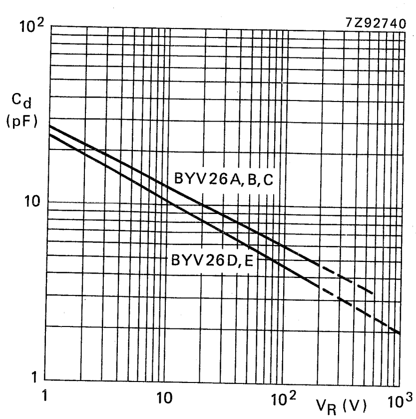


Fig. 10 Capacitance versus voltage: typical values; f = 1 MHz; T_j = 25 °C.

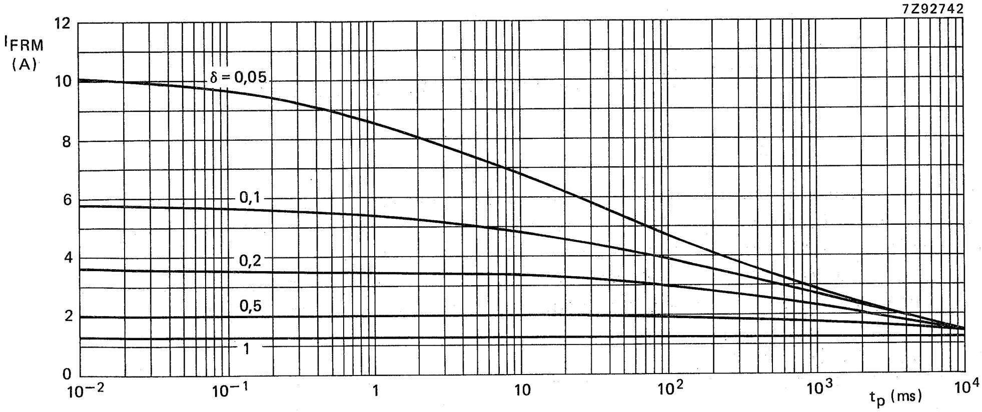


Fig. 11 Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{tp} = 85 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during 1 - δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

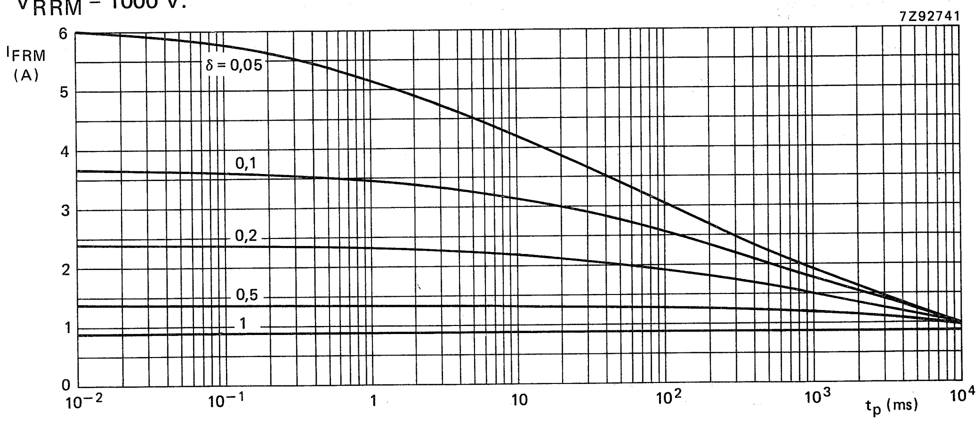


Fig. 12 Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during 1 - δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

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.

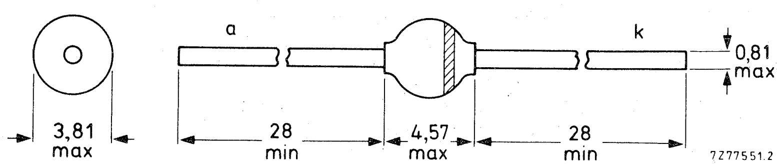
QUICK REFERENCE DATA

			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, $\delta = 0,5$				
$T_{tp} = 85\ ^oC$; lead length = 10 mm	$I_{F(AV)}$	max.	2	A
$T_{amb} = 60\ ^oC$; 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 with inductive load switched off:				
$I_R = 820$ mA at $T_j = 25\ ^oC$, prior to surge	E_{RSM}	max.	40	mJ
$I_R = 580$ mA at $T_j = T_{j\,max}$, prior to surge	E_{RSM}	max.	20	mJ
Storage temperature	T_{stg}		−65 to +175	^oC
Junction temperature	T_j	max.	175	^oC

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")

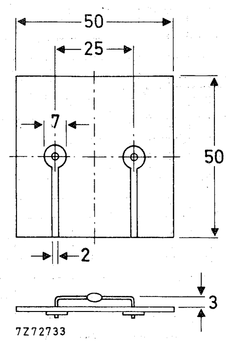


Fig. 2 Mounted on a printed-circuit board.

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

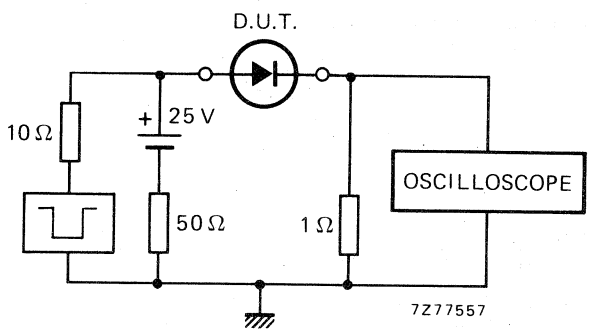


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ≤ 7 ns.
Source impedance 50 Ω. Rise time ≤ 15 ns.

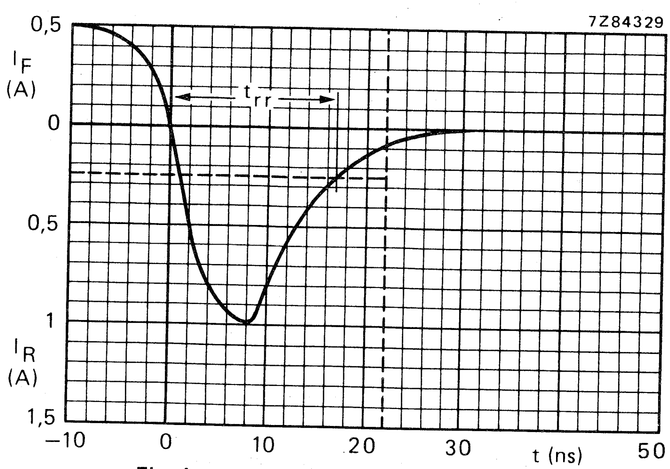


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

Reverse recovery when switched from $I_F = 1$ A to $V_R \geqslant 30$ V with $-dI_F/dt = 20$ A/µs (see Fig. 5)			
recovered charge	Q_s	<	15 nC
recovery time	t_{rr}	<	50 ns

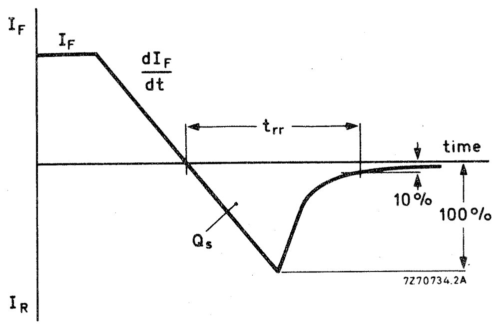


Fig. 5 Definitions of t_{rr} and Q_s.

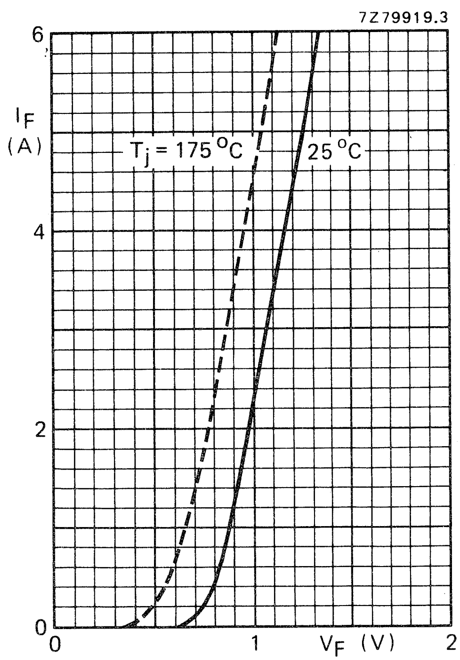


Fig. 6 Maximum forward voltage (V_F) curve.

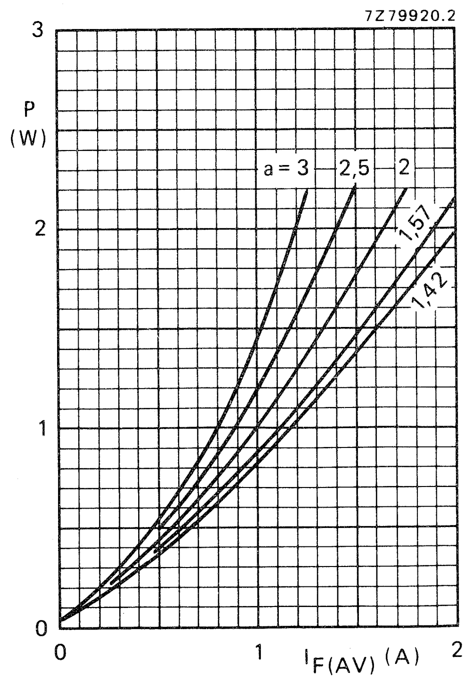


Fig. 7 $a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$.
Pulsed reverse voltage; $\delta = 0{,}5$.
(Including reverse current losses and switching losses up to f = 200 kHz).

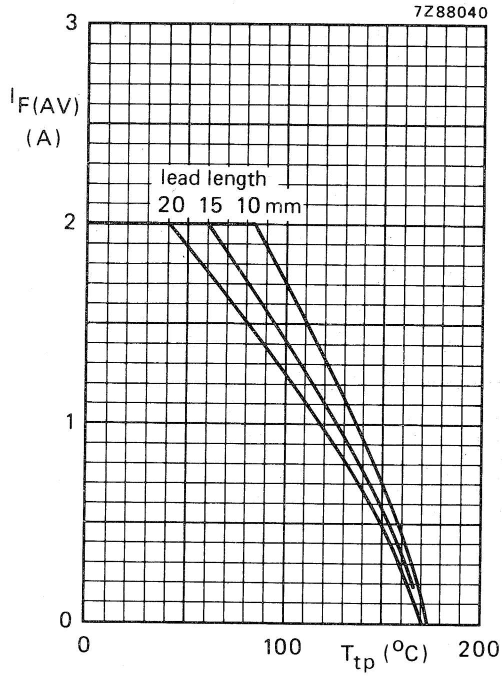


Fig. 8 Maximum average forward current.
The curves include losses due to reverse current and switching up to f = 200 kHz.
Pulsed reverse voltage, δ = 0,5.
$V_R = V_{RRMmax}$.
Square wave current, a = 1,42.

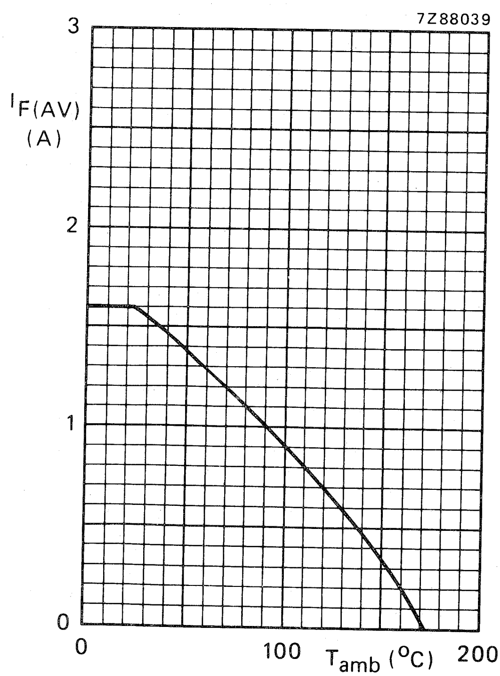


Fig. 9 Maximum average forward current.
The curve includes losses due to reverse current and switching up to f = 200 kHz.
Mounting method see Fig. 2.
Pulsed reverse voltage, δ = 0,5
$V_R = V_{RRMmax}$.
Square wave current, a = 1,42.

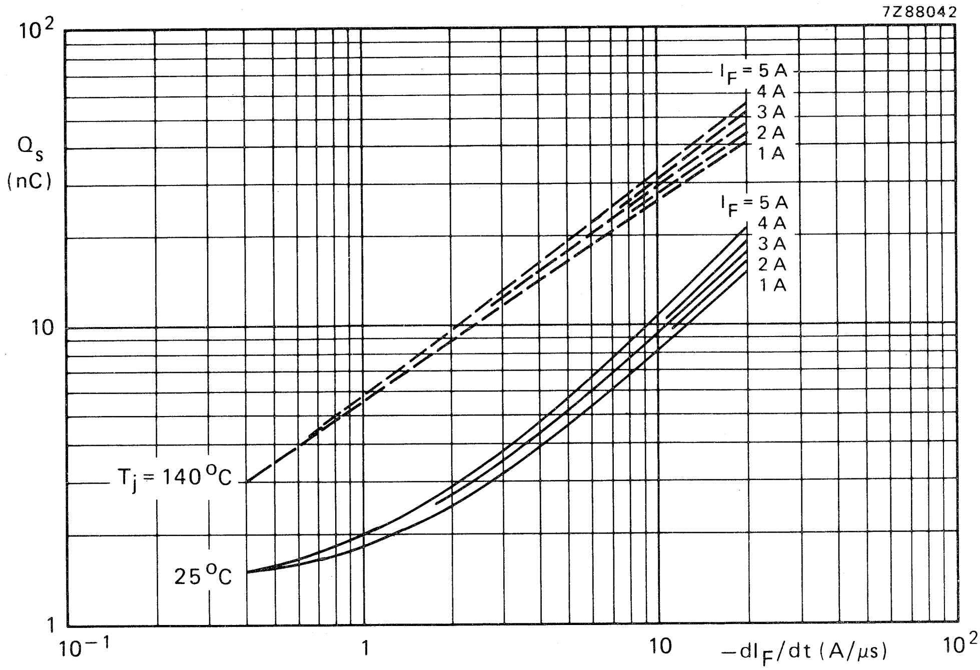


Fig. 10 Maximum values reverse recovery charge. For definition see Fig. 5.

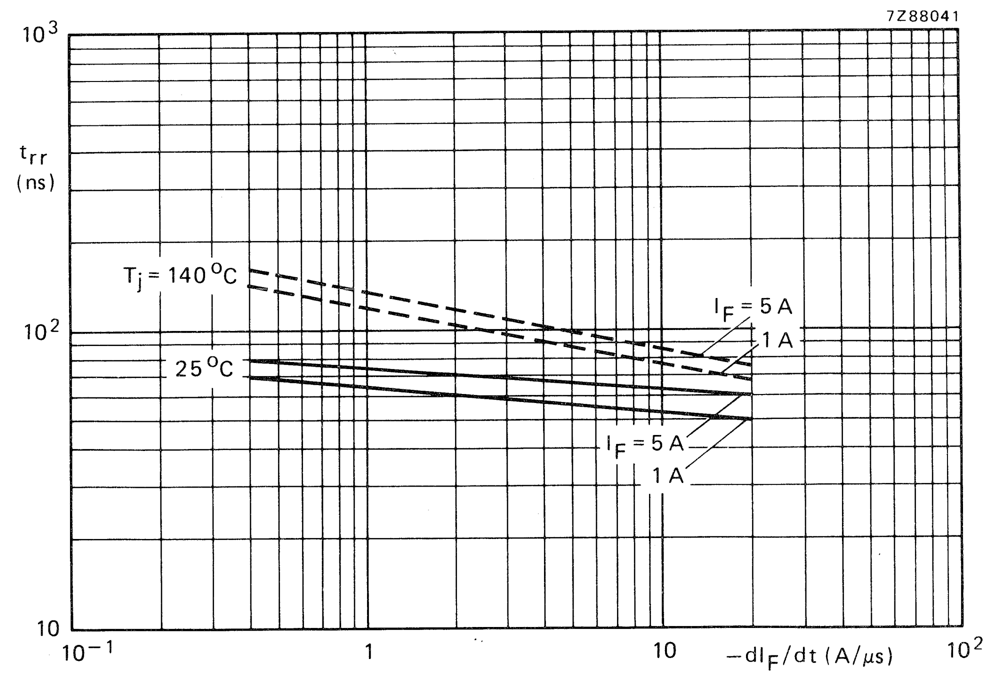


Fig. 11 Maximum values reverse recovery time. For definition see Fig. 5.

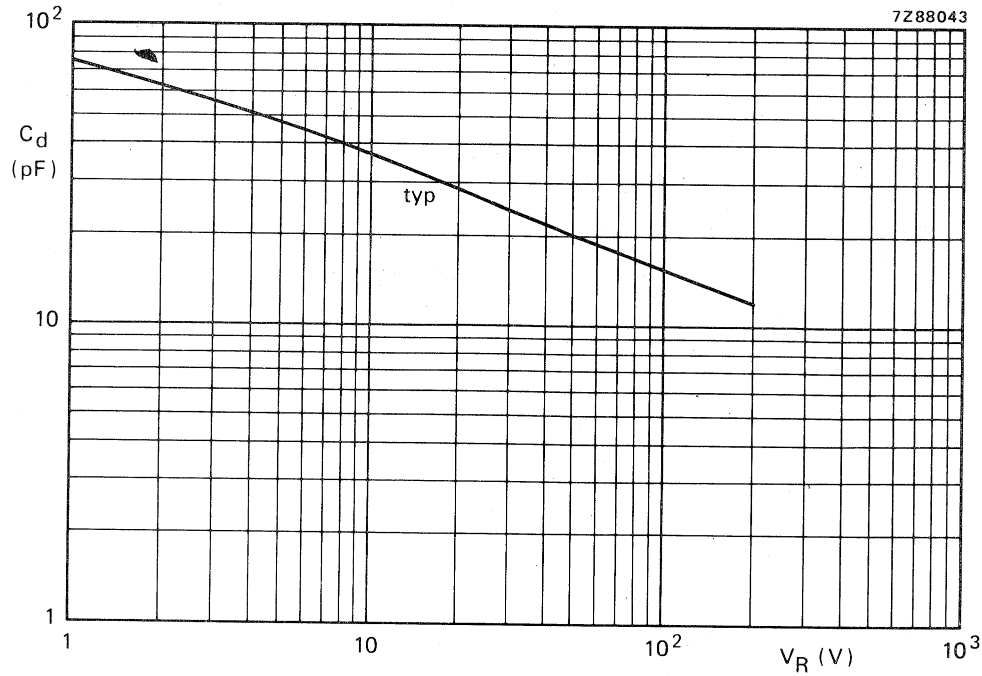


Fig. 12 Typical values diode capacitance at f = 1 MHz; T_j = 25 °C.

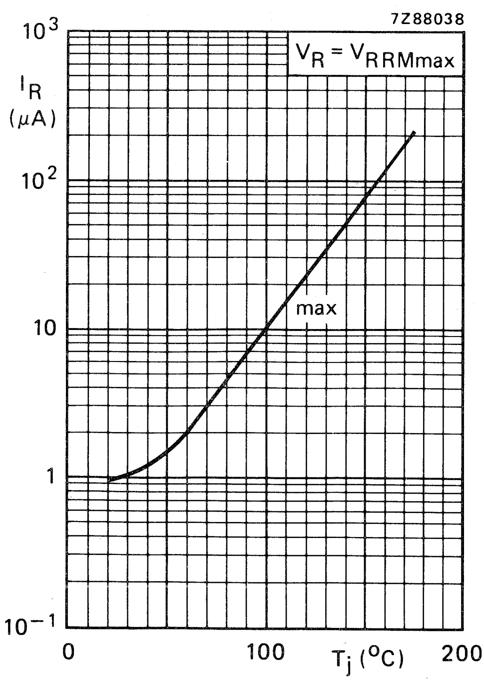


Fig. 13 Maximum values reverse current.

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.

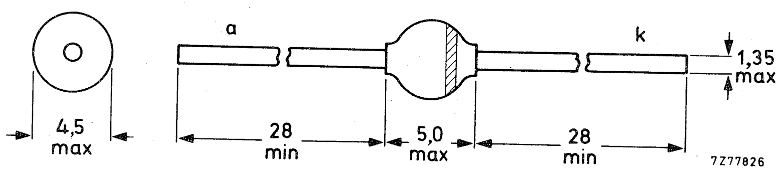
QUICK REFERENCE DATA

			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; with inductive load switched off				
I_R = 820 mA at T_j = 25 °C, prior to surge	E_{RSM}	max.	40	mJ
I_R = 580 mA at $T_j = T_{j\,max}$, 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 (see "Thermal model")	$R_{th\,j\text{-}a}$	=	75	K/W

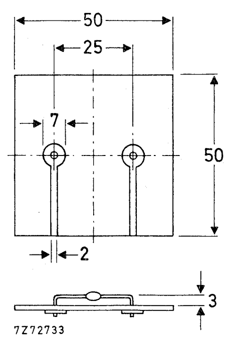


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C, unless otherwise specified

			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

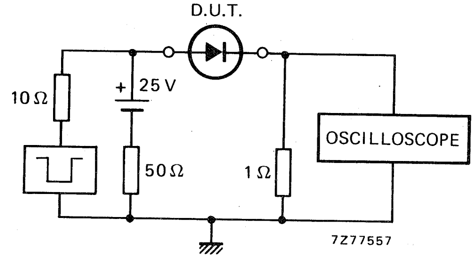


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF; Rise time ⩽ 7 ns.
Source impedance 50 Ω. Rise time ⩽ 15 ns.

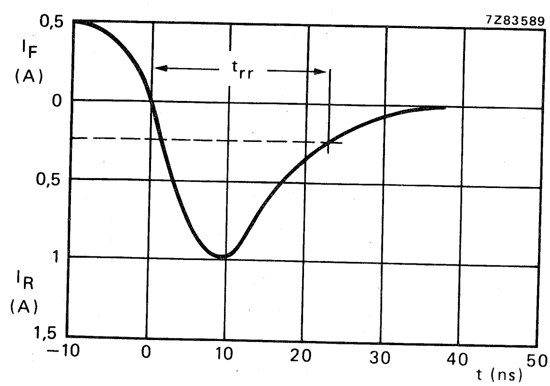


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

Reverse recovery when switched from
I_F = 1 A to $V_R \geq 30$ V with
$-dI_F/dt$ = 20 A/µs (see Fig. 5)

recovered charge	Q_s	<	20 nC
recovery time	t_{rr}	<	50 ns

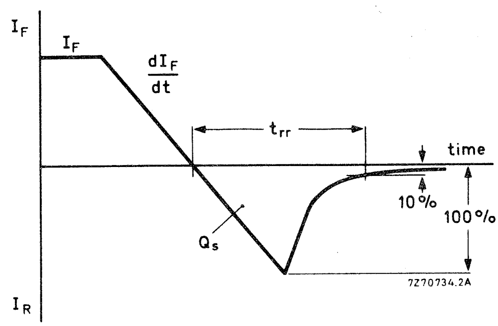


Fig. 5 Definitions of t_{rr} and Q_s.

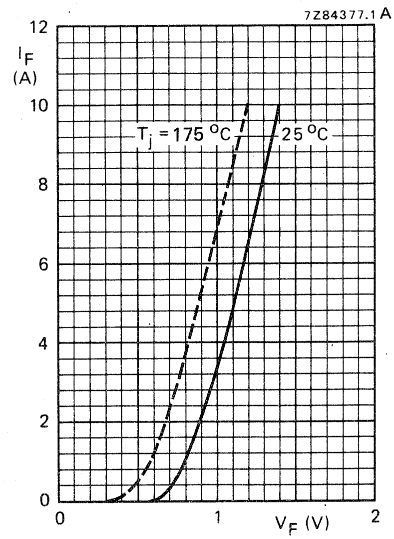


Fig. 6 Maximum forward voltage (V_F) curve.

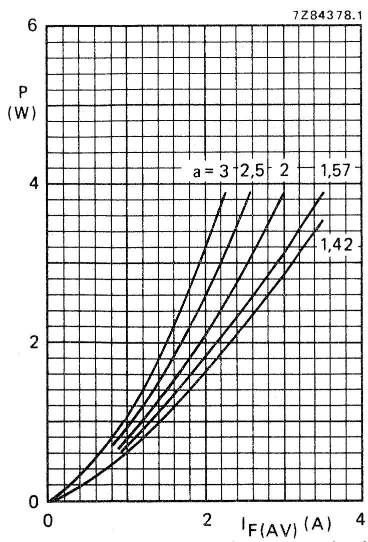


Fig. 7 Power dissipation (forward plus leakage current) as a function of the average forward current. Pulsed reverse voltage; δ = 50%.
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$.

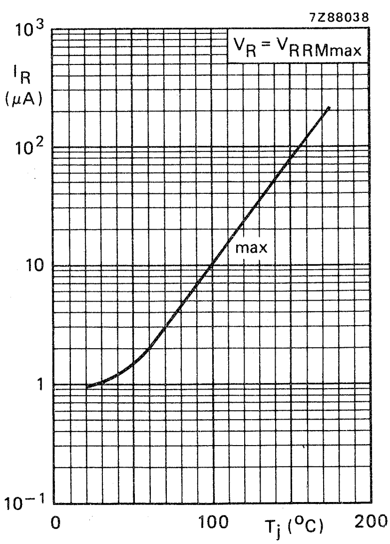


Fig. 8 Reverse current as a function of the junction temperature

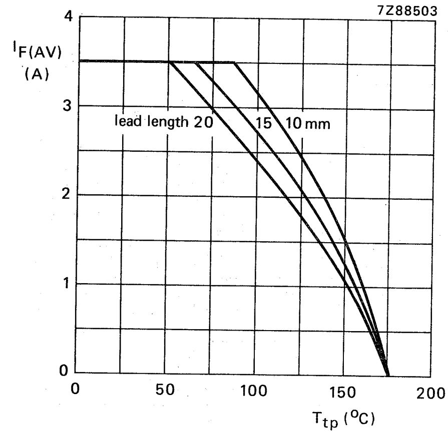


Fig. 9 Maximum average forward current. The curves include losses due to reverse current and switching up to f = 200 kHz.
Pulsed reverse voltage; δ = 0,5 $V_R = V_{RRM}$ max.
Square-wave current; a = 1,42.

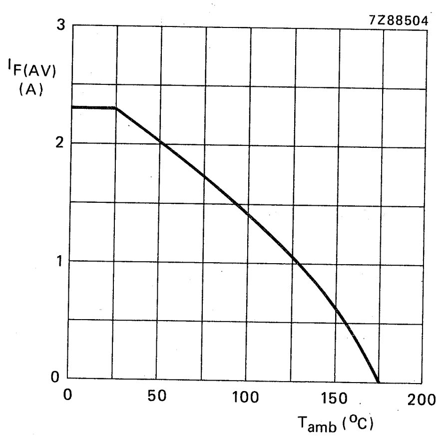


Fig. 10 Maximum average forward current. The curve includes losses due to reverse current and switching up to f = 200 kHz; mounting method see Fig. 2.
Pulsed reverse voltage; δ = 0,5 $V_R = V_{RRM}$ max.
Square-wave current; a = 1,42.

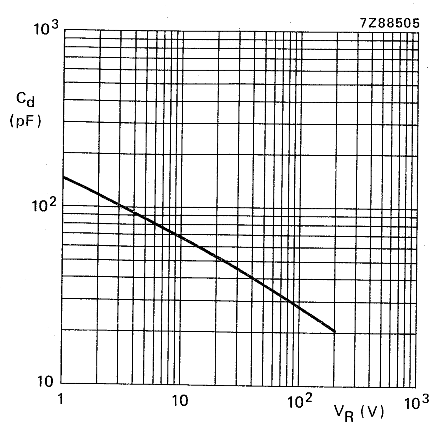


Fig. 11 Typical values diode capacitance at f = 1 MHz. T_j = 25 °C.

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.

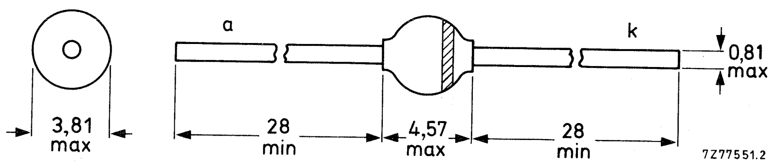
QUICK REFERENCE DATA

		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

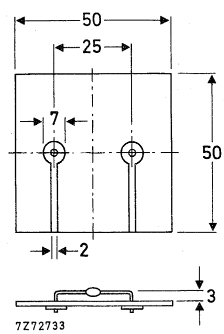


Fig. 2 Device mounted on a printed-circuit board.

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	<	5	5	5	5	5	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

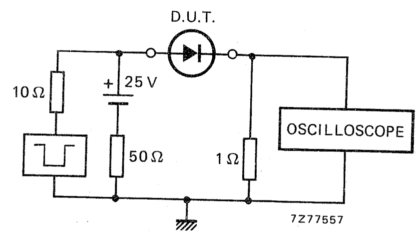


Fig. 3 Test circuit. Input impedance oscilloscope: 1 MΩ; 22 pF; rise time < 7 ns.
Source impedance: 50 Ω; rise time < 15 ns.

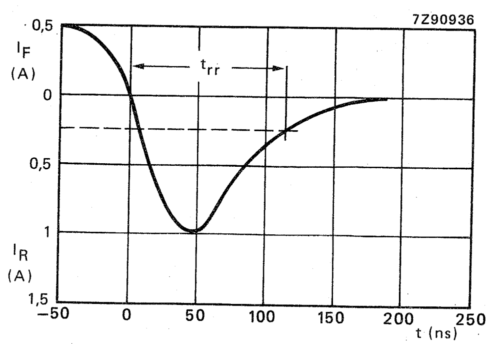


Fig. 4 Reverse recovery time characteristic.

* Measured under pulse conditions to avoid excessive dissipation.

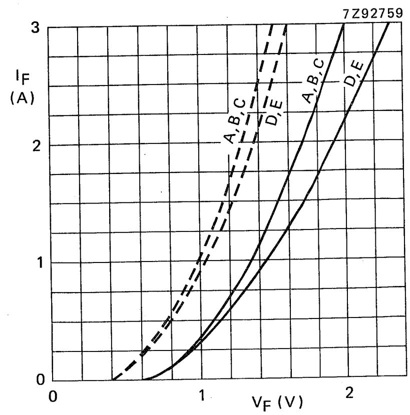


Fig. 5 Maximum forward voltage at
——— T_j = 25 °C; – – – T_j = 175 °C.

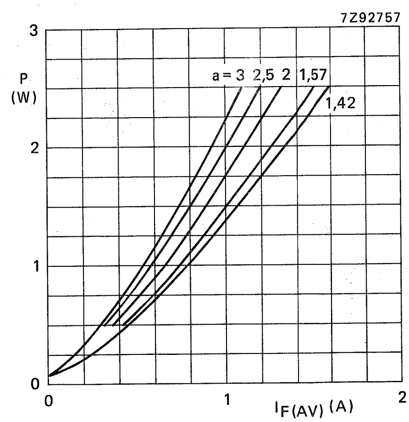
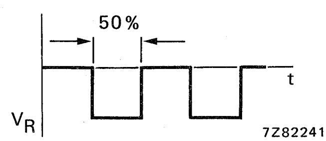


Fig. 6a **BYV36A; B; C.**

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.
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$, $\delta = 0{,}5$.



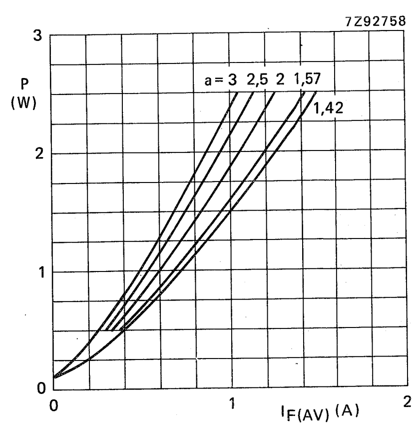


Fig. 6b **BYV36D; E.**

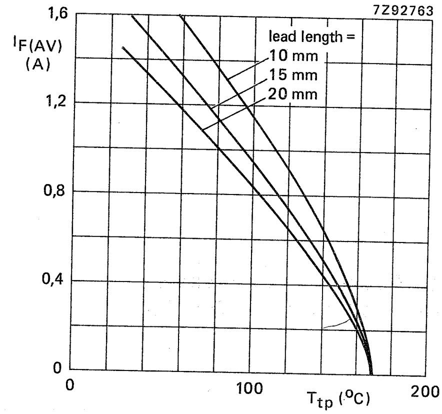
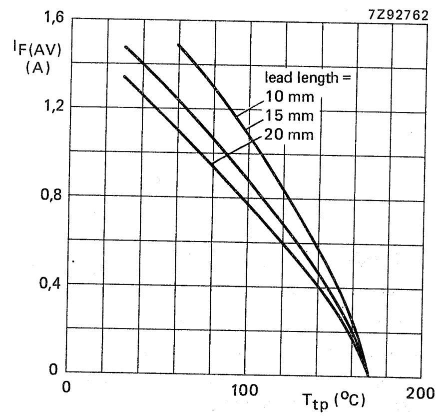


Fig. 7a **BYV36A; B; C.**



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.
$V_R = V_{RRMmax}$, $\delta = 0,5$; a = 1,42.

Fig. 7b **BYV36D; E.**

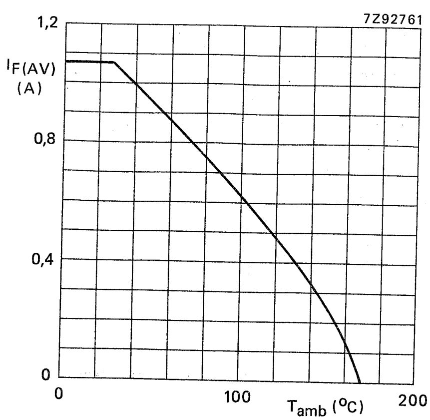


Fig. 8a **BYV36A; B; C.** Maximum average forward current versus ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application.
$V_R = V_{RRMmax}$, $\delta = 0,5$; a = 1,42.

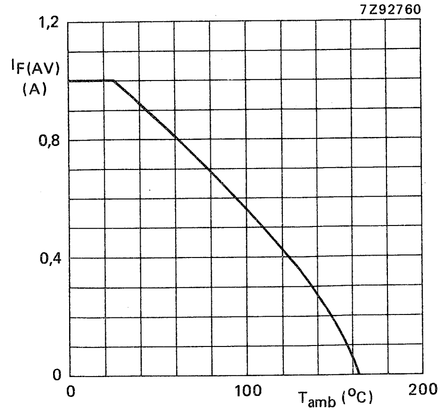


Fig. 8b **BYV36D; E**. Maximum average forward current versus ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application. $V_R = V_{RRMmax}$, $\delta = 0{,}5$; a = 1,42.

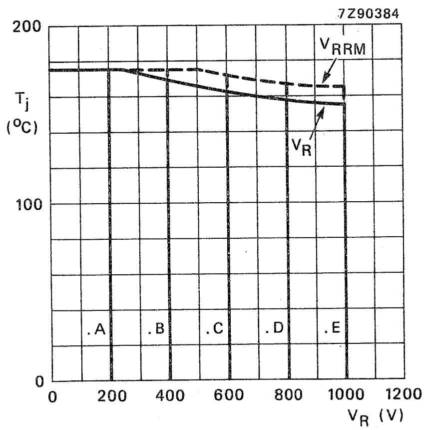


Fig. 9 Maximum permissible junction temperature versus applied reverse voltage.

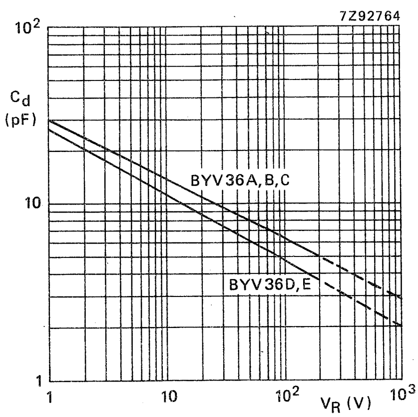


Fig. 10 Capacitance versus reverse voltage: typical values; f = 1 MHz; T_j = 25 °C.

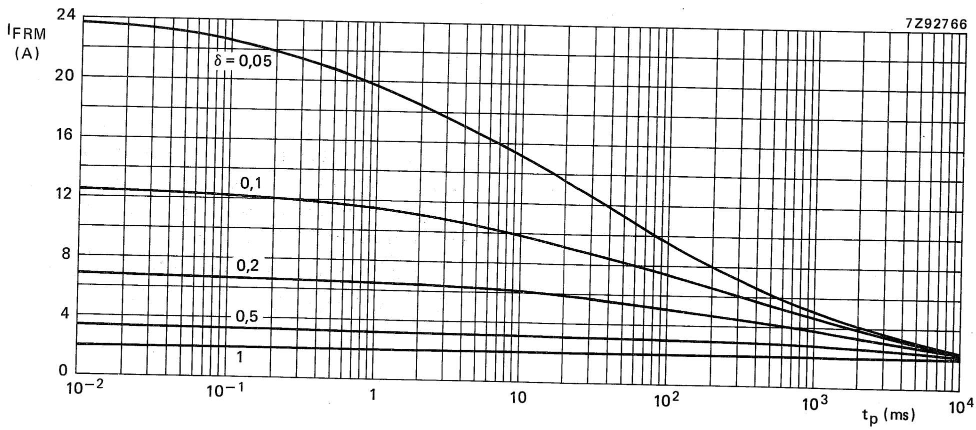


Fig. 11 **BYV36A; B; C.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at $T_{tie\text{-}point}$ = 60 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

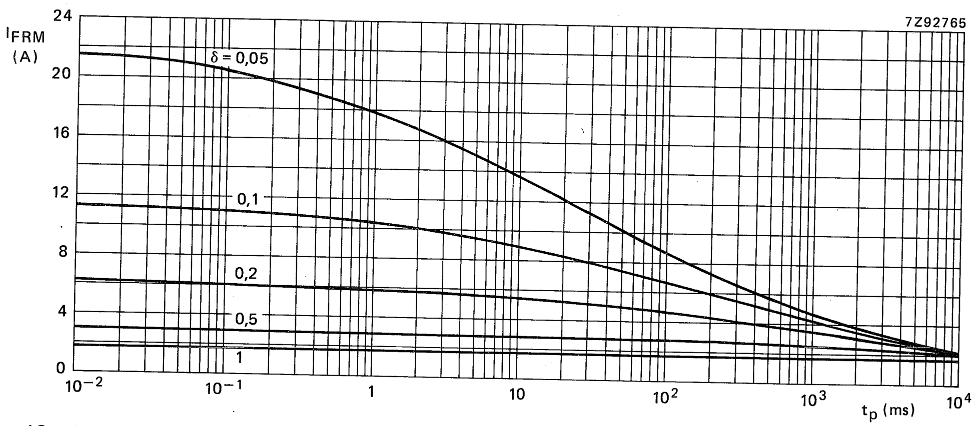


Fig. 12 **BYV36D; E.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at $T_{tie\text{-}point}$ = 60 °C; $R_{th\ j\text{-}tp}$ = 46 K/W; V_{RRM} during 1 − δ; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

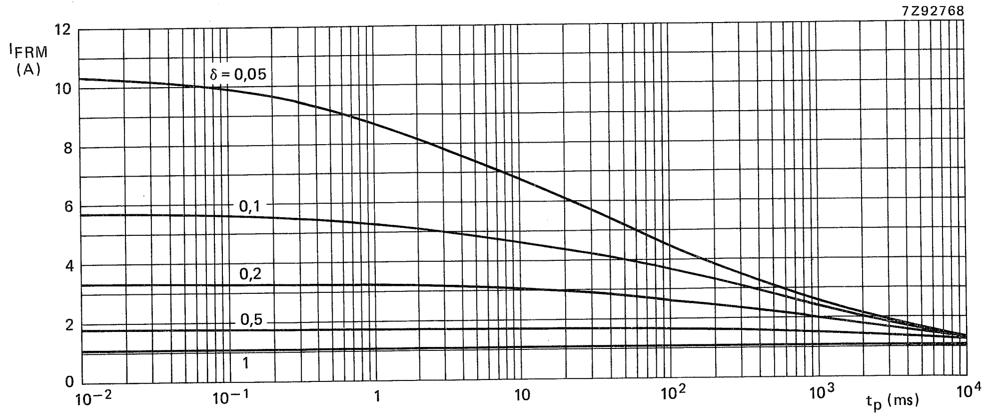


Fig. 13 **BYV36A; B; C.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 600 V.

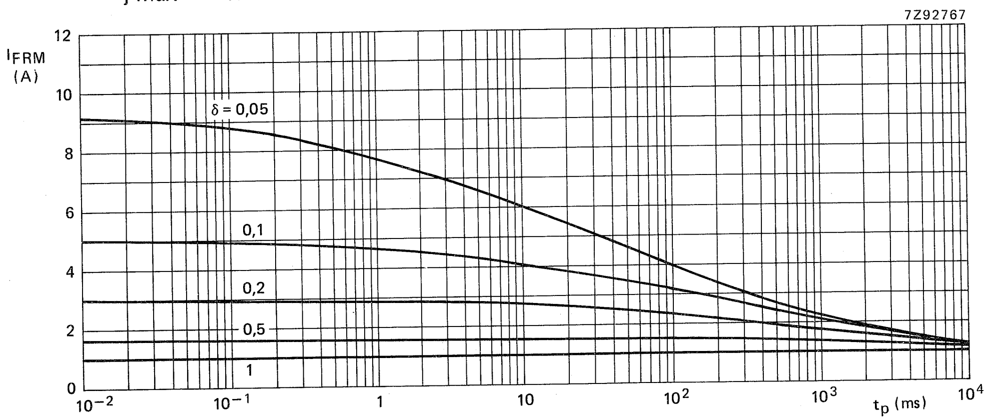


Fig. 14 **BYV36D; E.** Maximum repetitive peak forward current versus pulse time (square pulse) and duty factor δ at T_{amb} = 60 °C; $R_{th\ j\text{-}a}$ = 100 K/W; V_{RRM} during $1 - \delta$; the curves include derating for $T_{j\ max}$ at V_{RRM} = 1000 V.

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).

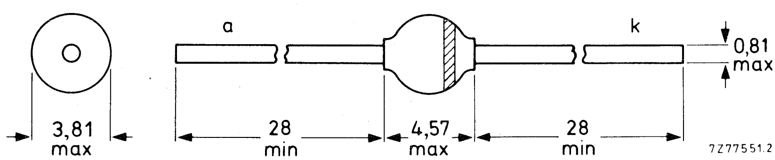
QUICK REFERENCE DATA

			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

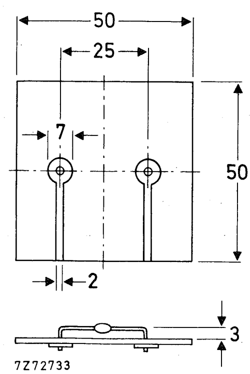


Fig. 2 Mounted on a printed-circuit board.

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 $V_R \geq$ 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 $V_R \geq$ 30 V with $-dI_F/dt$ = 1 A/μs	$\lvert dI_R/dt \rvert$	<		6		A/μs

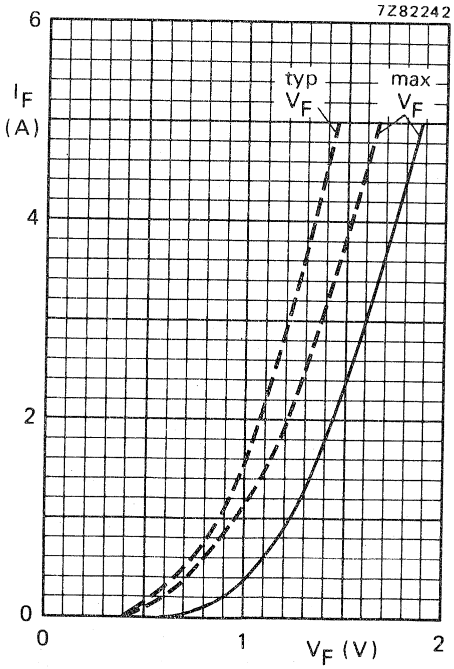


Fig. 3 ——— T_j = 25 °C; – – – $T_j = T_{j\,max}$.

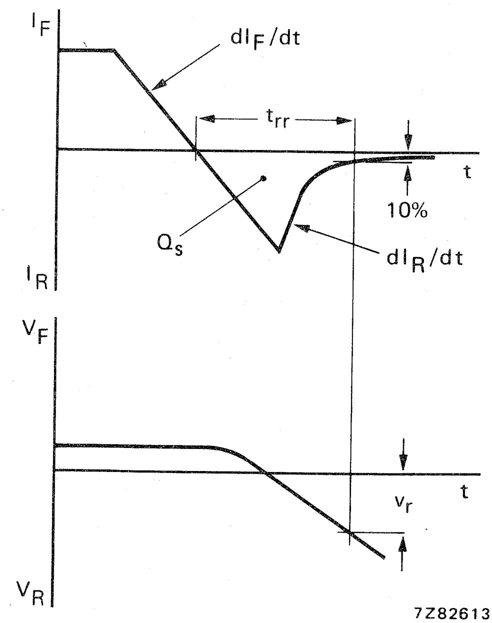


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

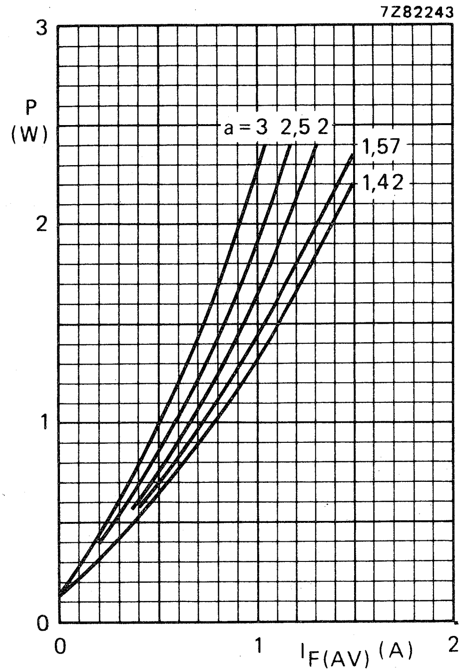
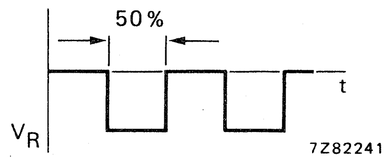


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application;
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$



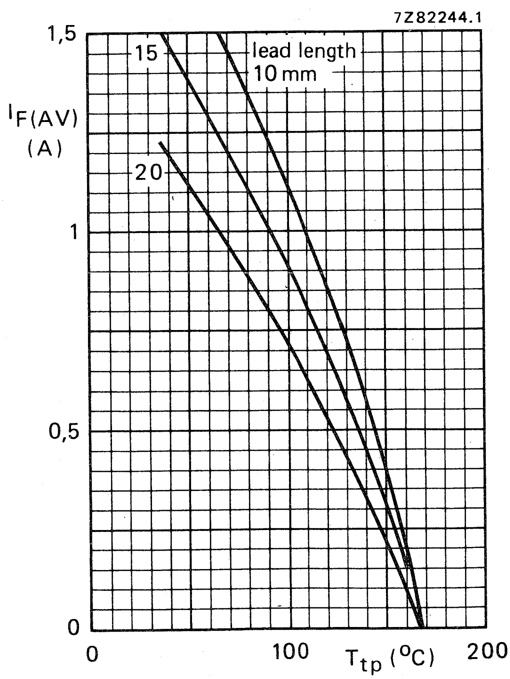


Fig. 6 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; $\delta = 50\%$; a = 1,57.

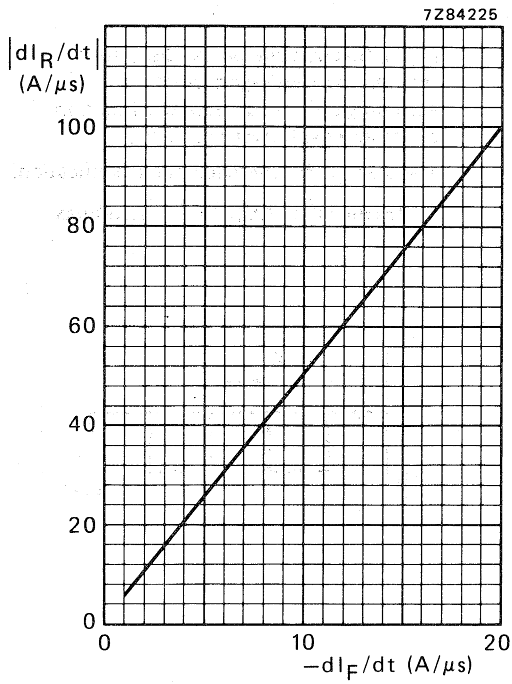


Fig. 7 Maximum slope of reverse recovery current. T_j = 25 °C

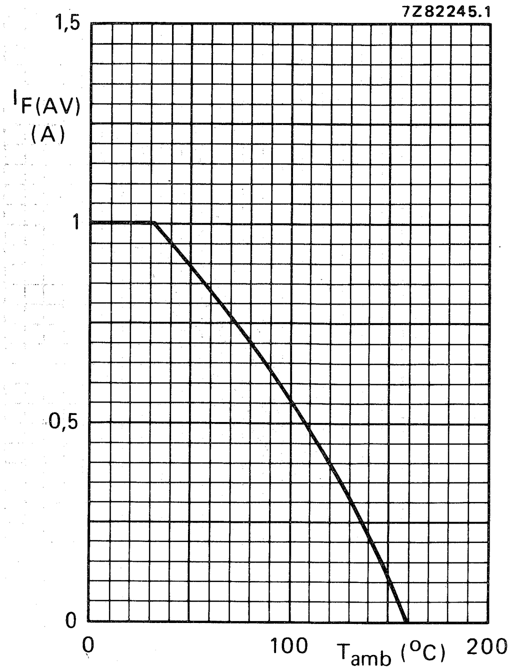


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage.
Mounting method see Fig. 2.
The graph is for switched-mode application.
$V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

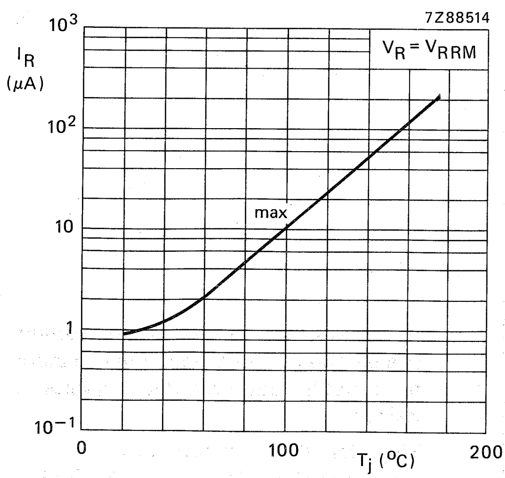


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM}$.

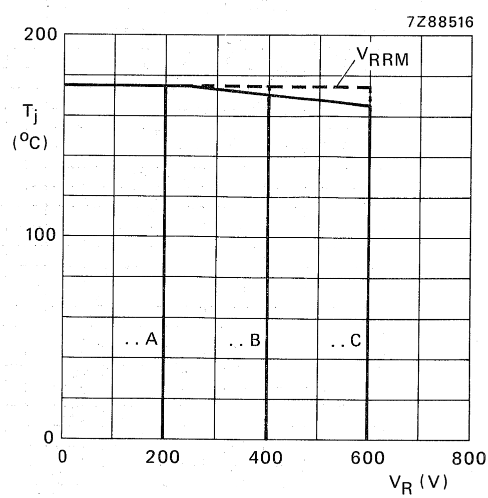


Fig. 10 Maximum junction temperature as a function of reverse voltage.

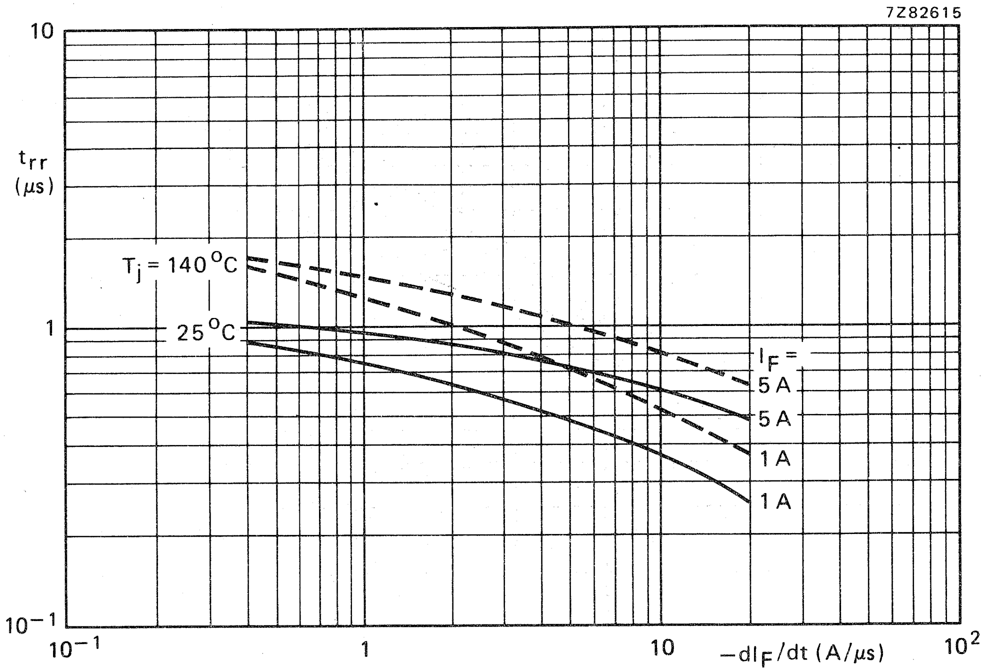


Fig. 11 Maximum values (see also Fig. 4).

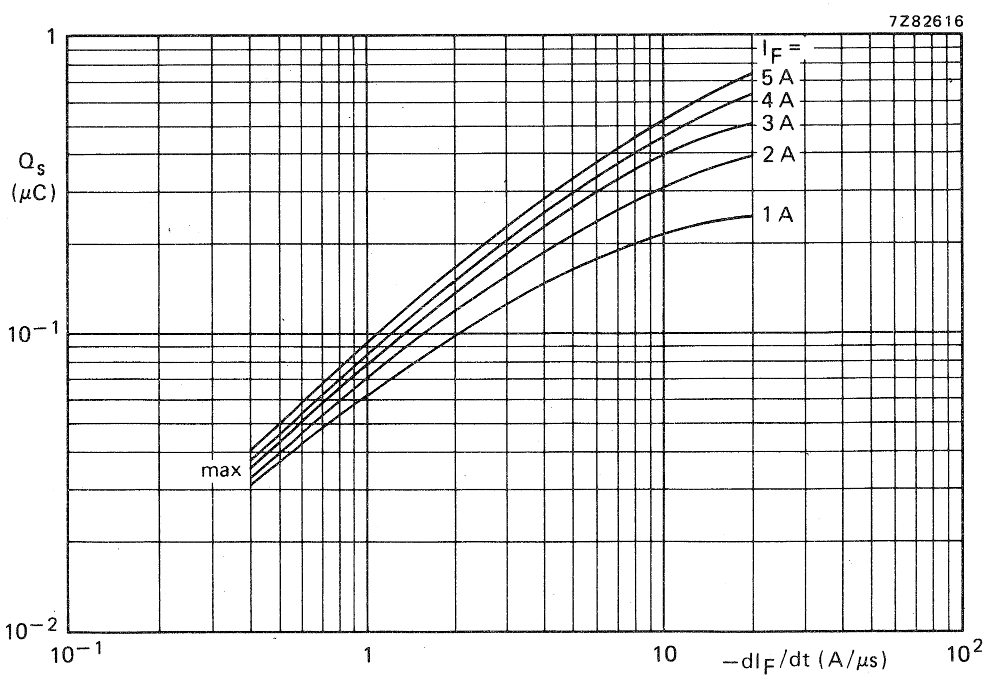


Fig. 12 Maximum values at T_j = 25 °C (see also Fig. 4).

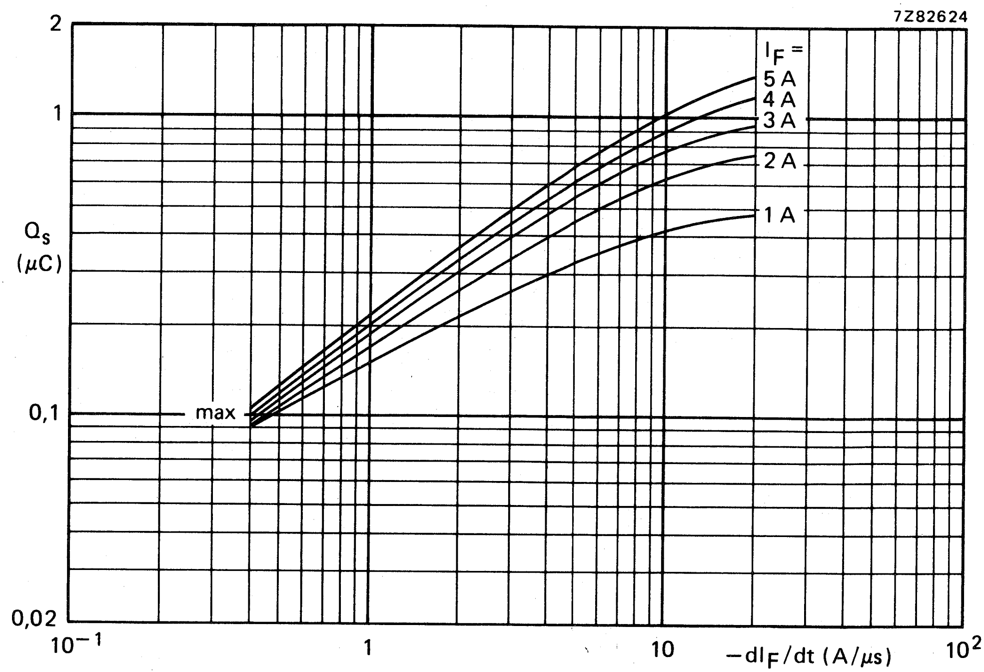


Fig. 13 Maximum values at T_j = 140 °C (see also Fig. 4).

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).

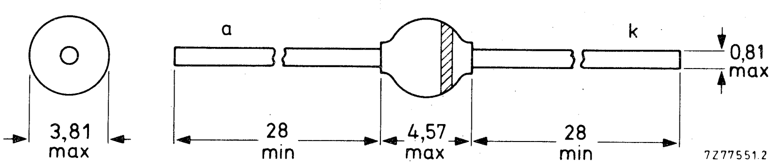
QUICK REFERENCE DATA

			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

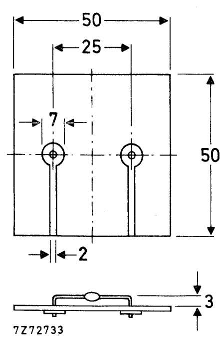


Fig. 2 Mounted on a printed-circuit board.

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 $V_R \geqslant 30$ 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; $-dI_F/dt$ = 1 A/μs	$\lvert dI_R/dt \rvert$	<	5		A/μs

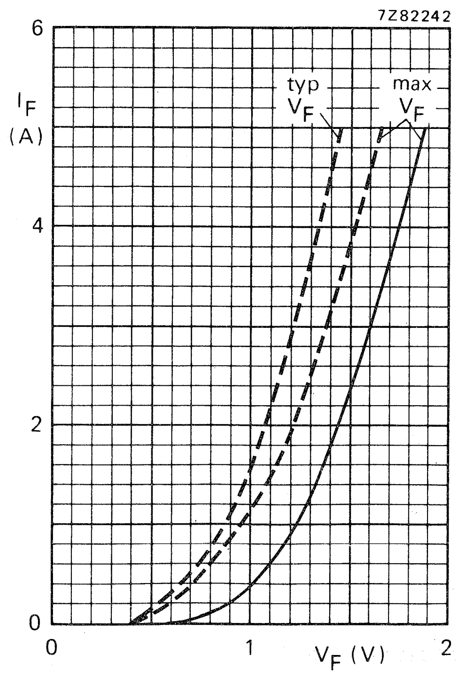


Fig. 3 —— T_j = 25 °C; – – – $T_j = T_{j\,max}$.

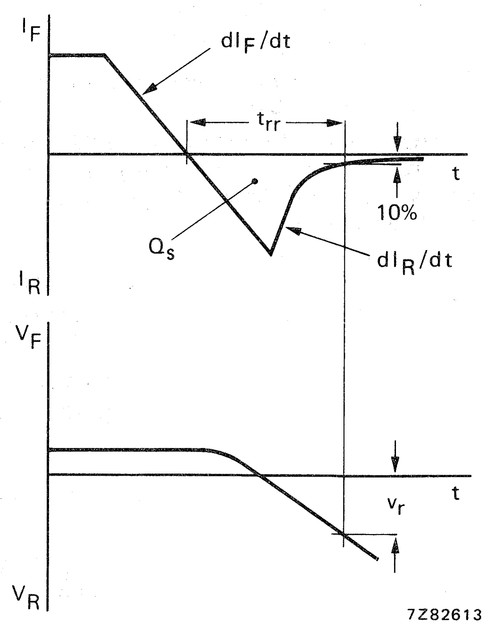


Fig. 4 Definitions of t_{rr} and Q_s.

* Measured under pulse conditions to avoid excessive dissipation.

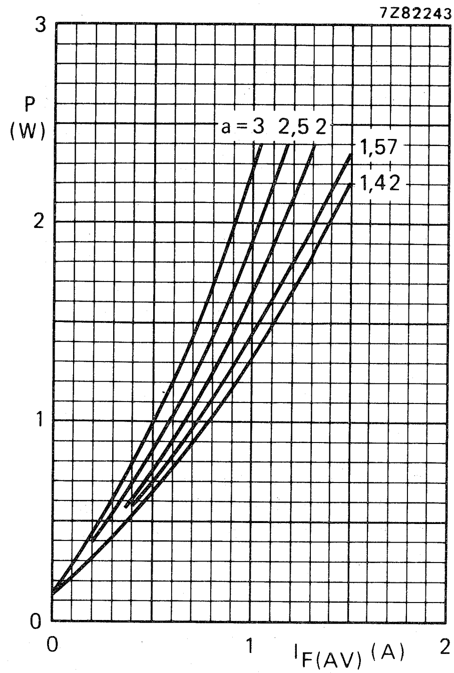
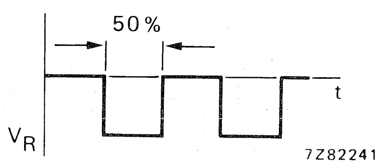


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.
The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRM\,max}$



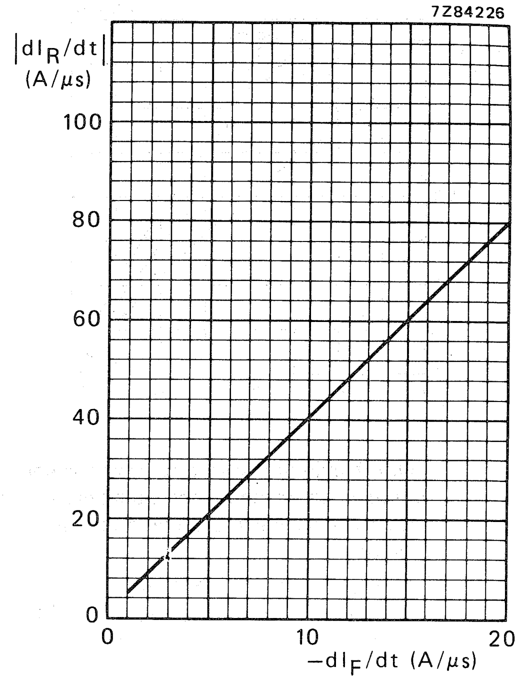


Fig. 6 Maximum slope of reverse recovery current. T_j = 25 °C.

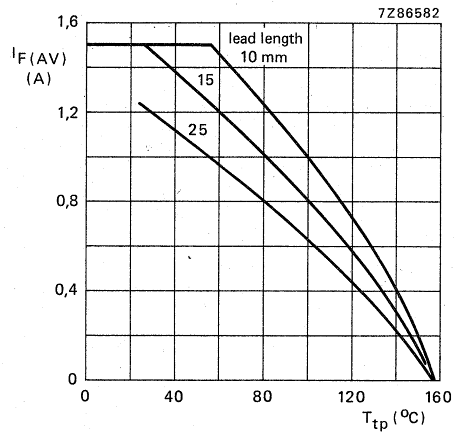


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRM\,max}$; δ = 50%; a = 1,57.

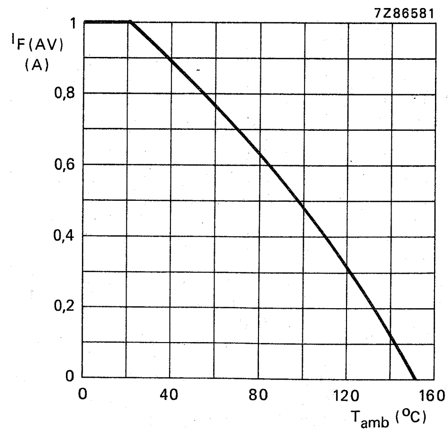


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage.
Mounting method see Fig. 2.

The graph is for switched-mode application. $V_R = V_{RRM\,max}$; δ = 50%; a = 1,57.

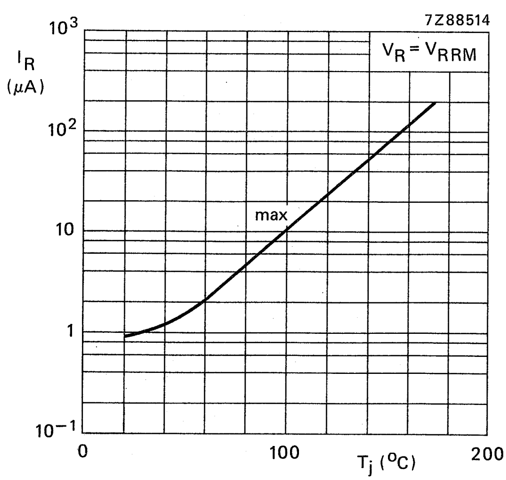


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM\,max}$.

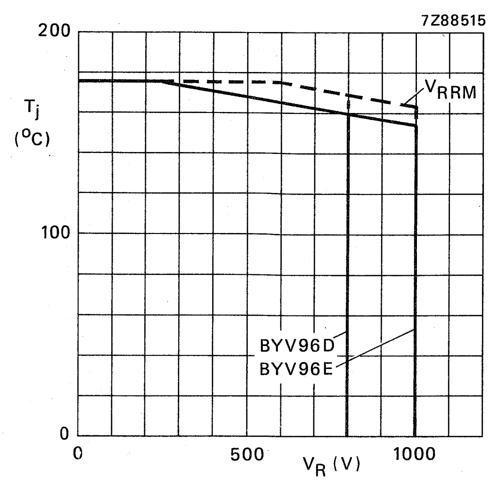


Fig. 10 Maximum values junction temperature.

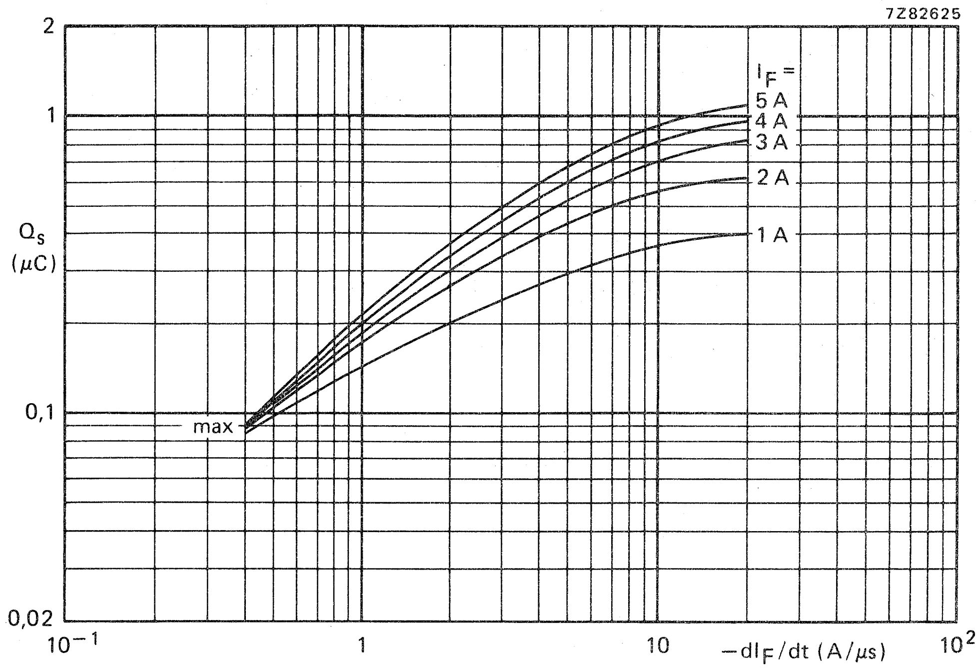


Fig. 11 Maximum values; T_j = 25 °C (see also Fig. 4).

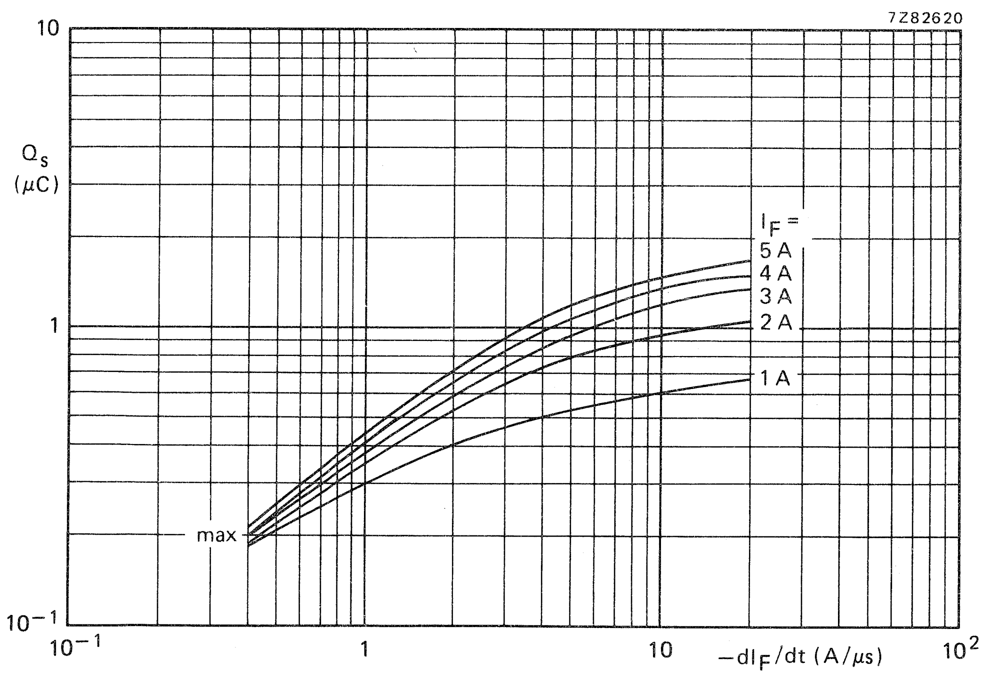


Fig. 12 Maximum values; T_j = 140 °C (see also Fig. 4).

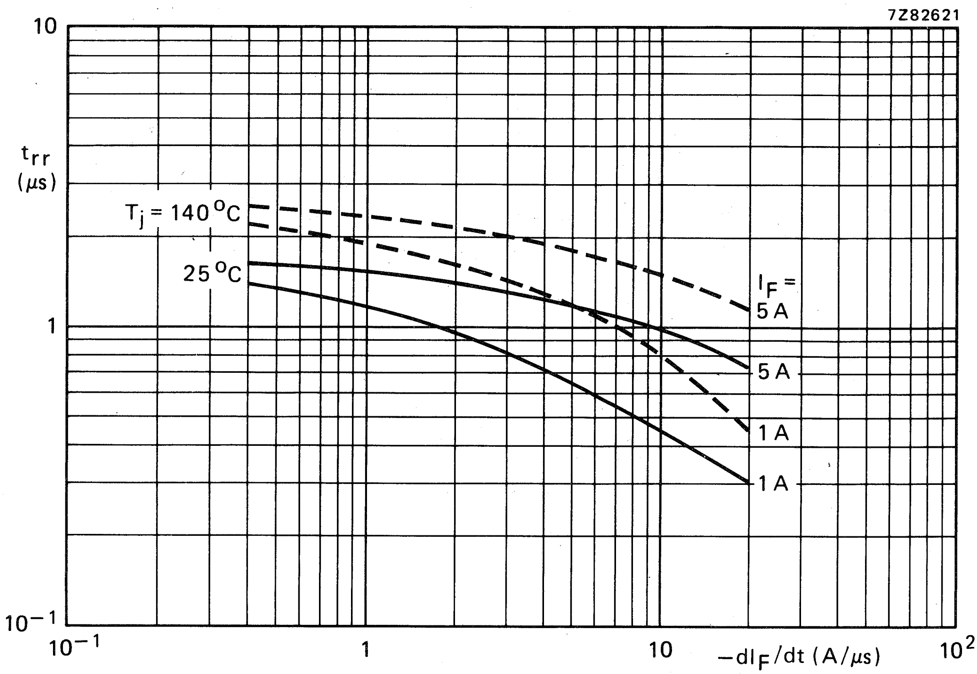


Fig. 13 Maximum values (see also Fig. 4).

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.

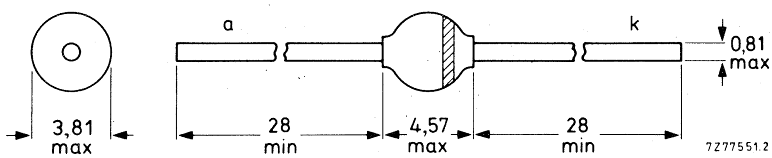
QUICK REFERENCE DATA

			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.

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

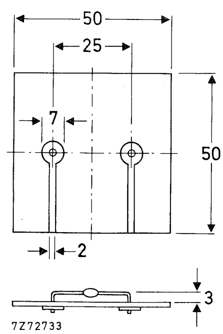


Fig. 2 Device mounted on a printed circuit board.

CHARACTERISTICS

			BYW54	BYW55	BYW56	
Forward voltage; T_j = 25 °C *						
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		>	650	900	1100	V
I_R = 0,1 mA; T_j = 25 °C	$V_{(BR)R}$	<	1000	1300	1600	V
Reverse current						
$V_R = V_{RWM\,max}$; T_j = 25 °C**	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 $V_R \geq$ 30 V with $-dI_F/dt$ = 5 A/μs; T_j = 25 °C	Q_s	typ.		3		μC
Reverse recovery time when switched from I_F = 1 A to $V_R \geq$ 30 V with $-dI_F/dt$ = 5 A/μs; T_j = 25 °C	t_{rr}	typ.		2,5		μs
Diode capacitance V_R = 0 V; f = 1 MHz; T_j = 25 °C	C_d	typ.		50		pF

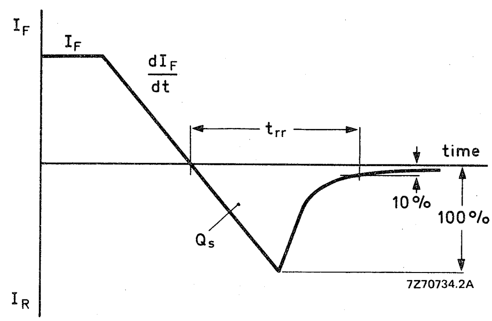


Fig. 3 Definitions of t_{rr} and Q_s.

* Measured under pulse conditions to avoid excessive dissipation.
** Illuminance ≤ 500 lux (daylight); relative humidity < 65%.

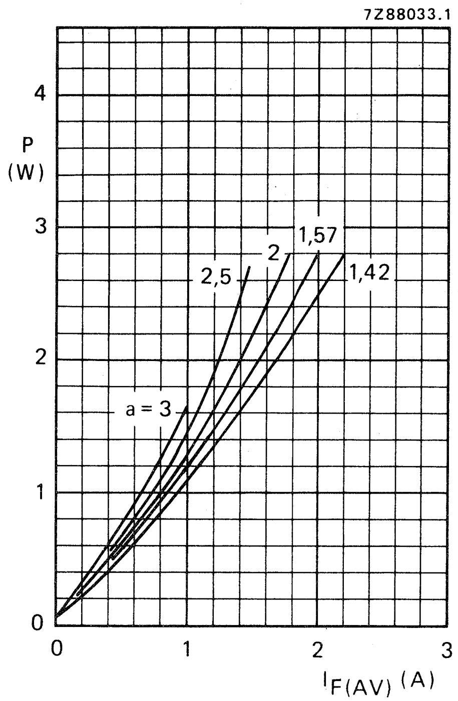


Fig. 4 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

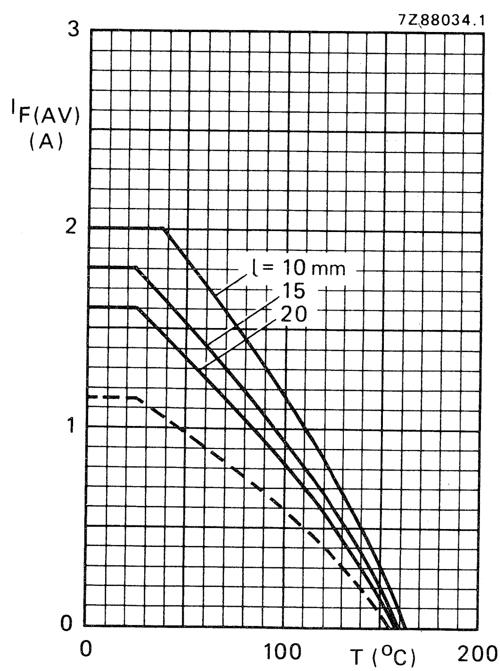


Fig. 5 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.

$a = 1{,}57$; $V_R = V_{RWMmax}$; l = lead length
——— T = tie-point temperature
– – – – T = ambient temperature and device mounted as shown in Fig. 2.

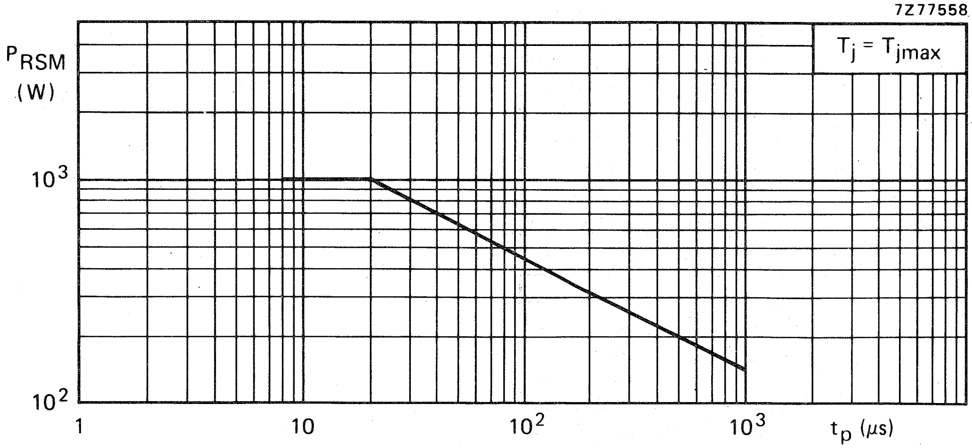
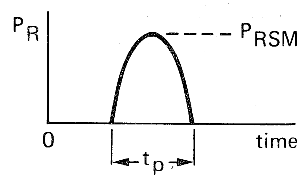


Fig. 6 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



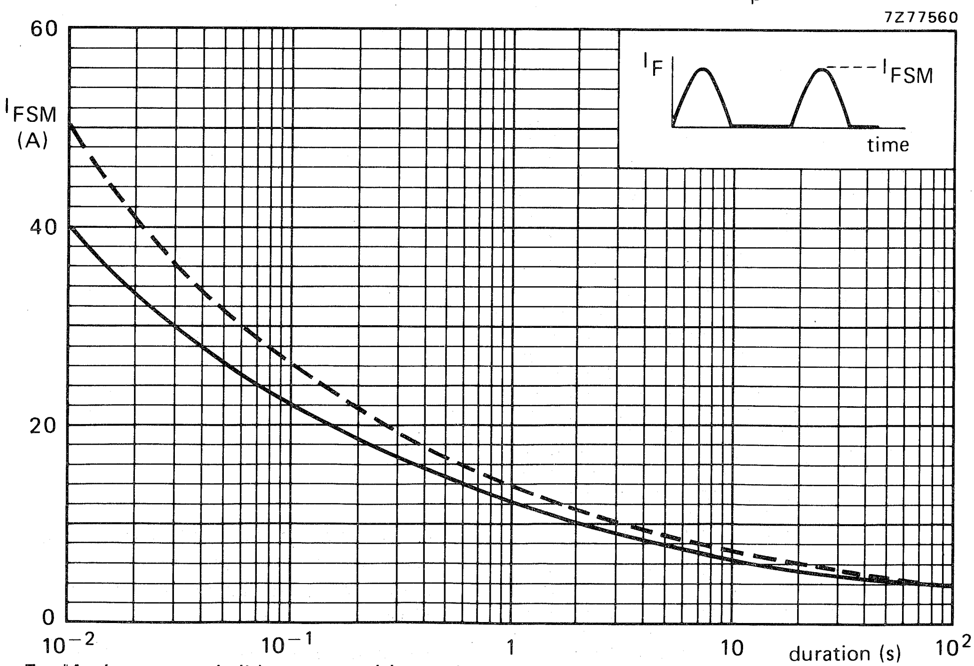


Fig. 7 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz) ·

– – – – – T_j = 25 °C; V_R = 0.

———— $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RWM\,max}$.

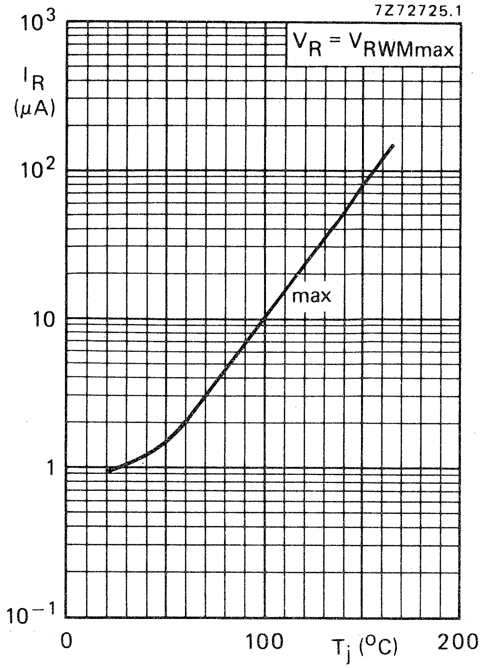


Fig. 8.

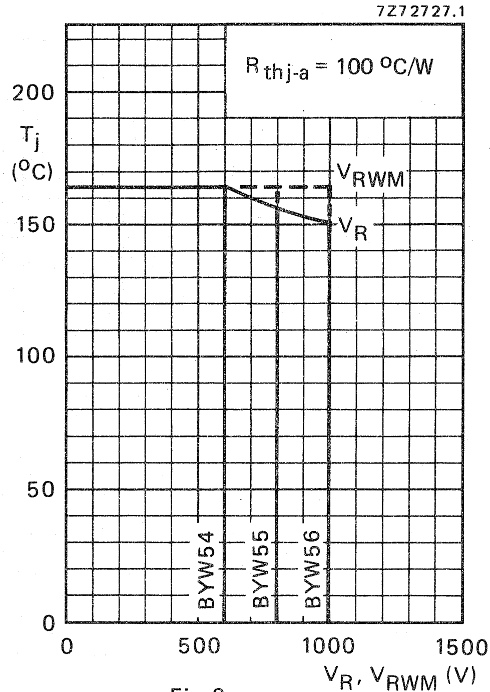


Fig. 9.

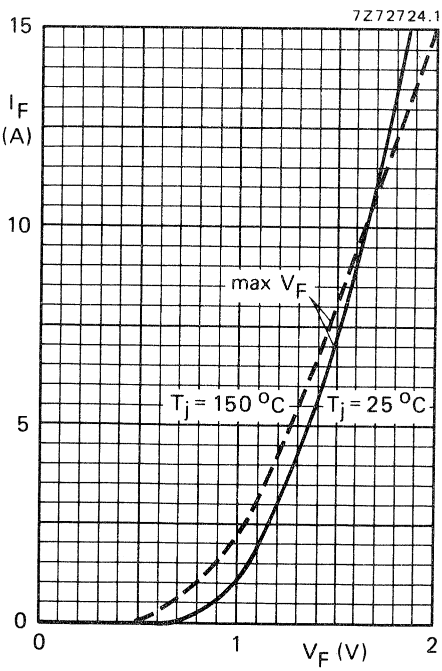


Fig. 10.

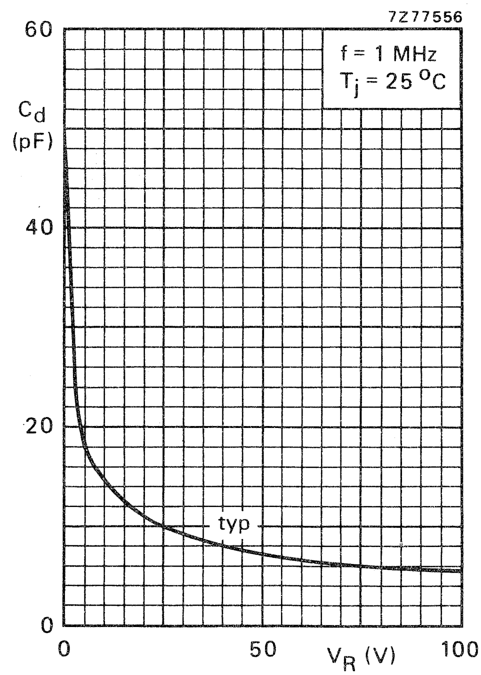


Fig. 11.

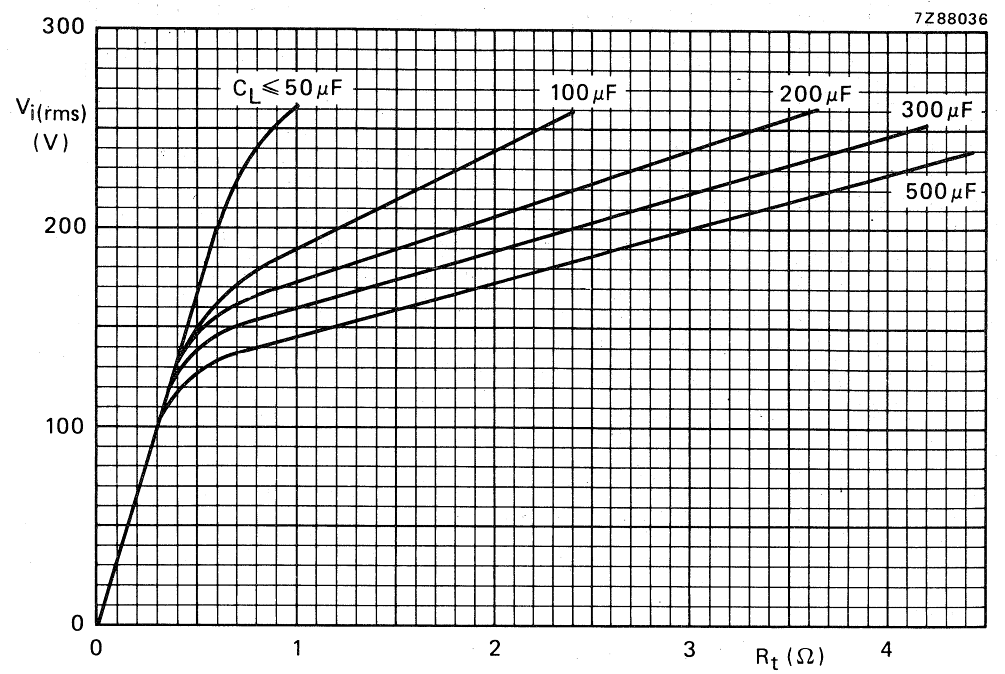


Fig. 12 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

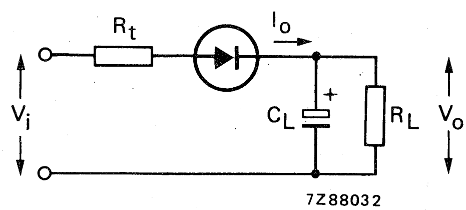


Fig. 13 Test circuit series resistance (R_t).

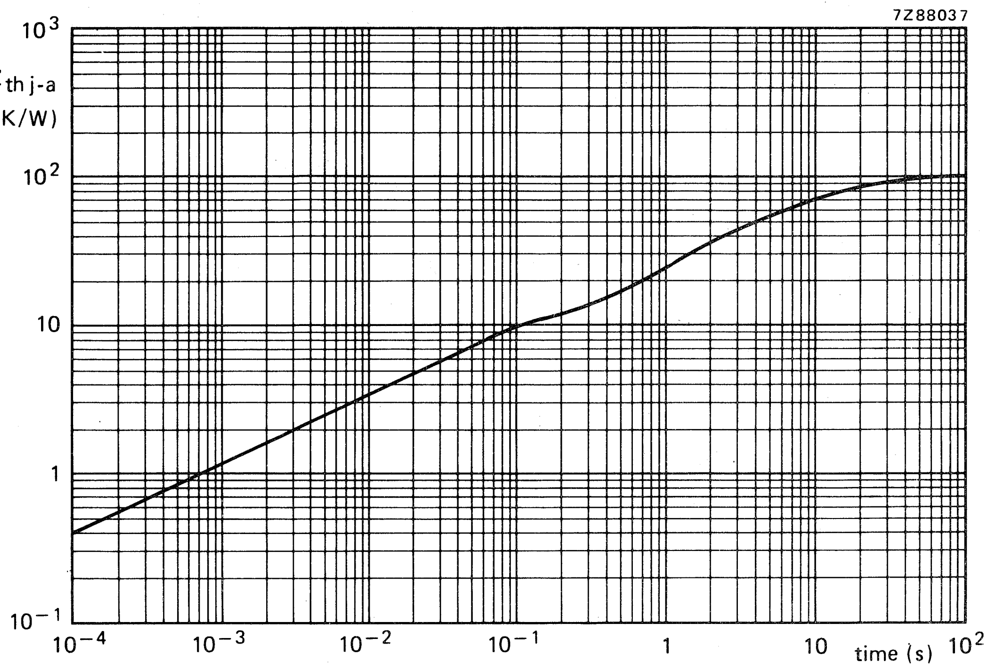


Fig. 14.
Device mounted on a printed circuit board (see Fig. 2).

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).

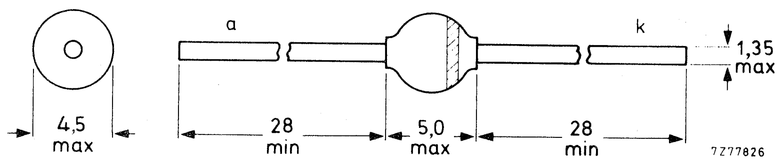
QUICK REFERENCE DATA

			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

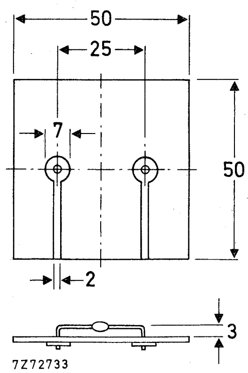


Fig. 2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C 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°	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	<		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	$\lvert dI_R/dt \rvert$	<		6		A/μs

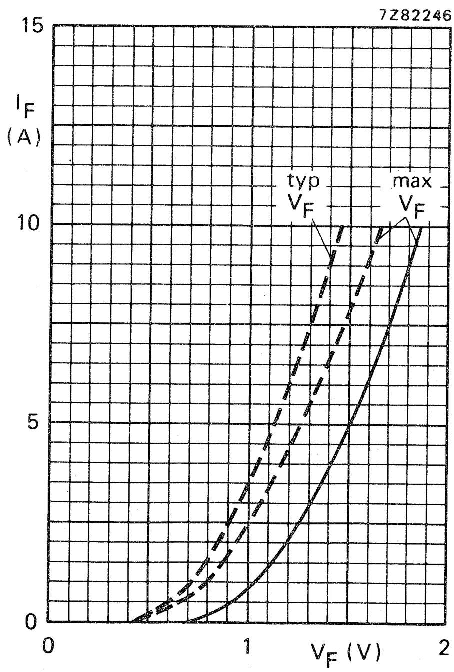


Fig. 3 —— T_j = 25 °C; – – – $T_j = T_{j\,max}$.

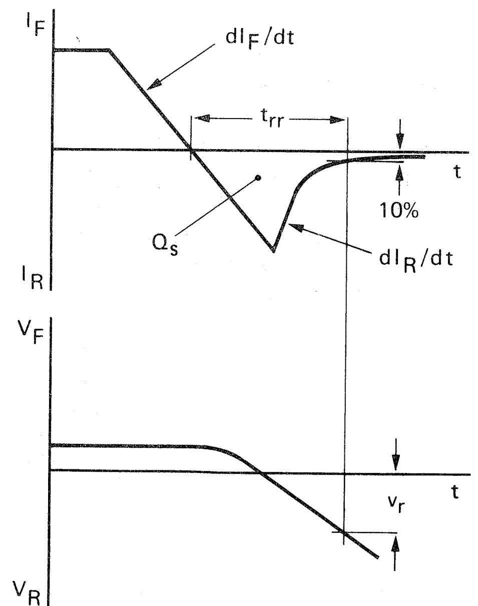


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

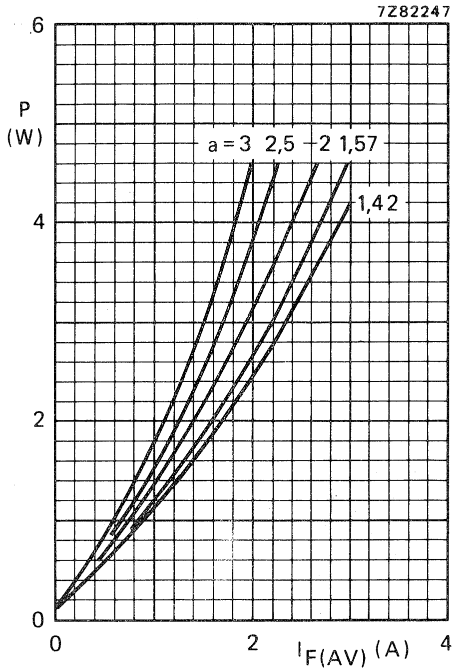


Fig. 5.

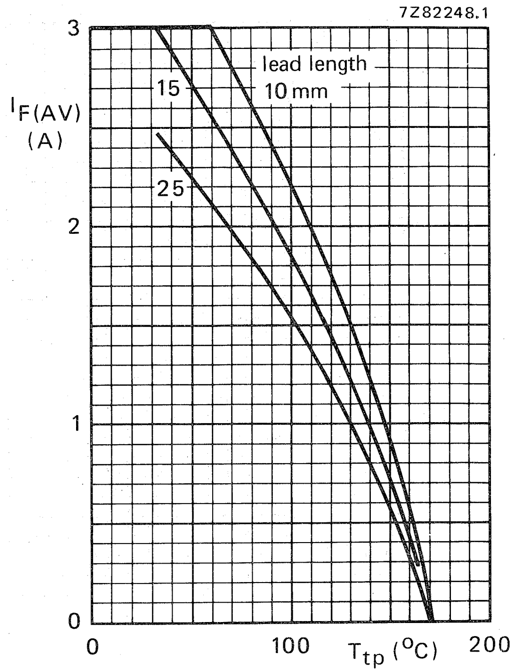


Fig. 6.

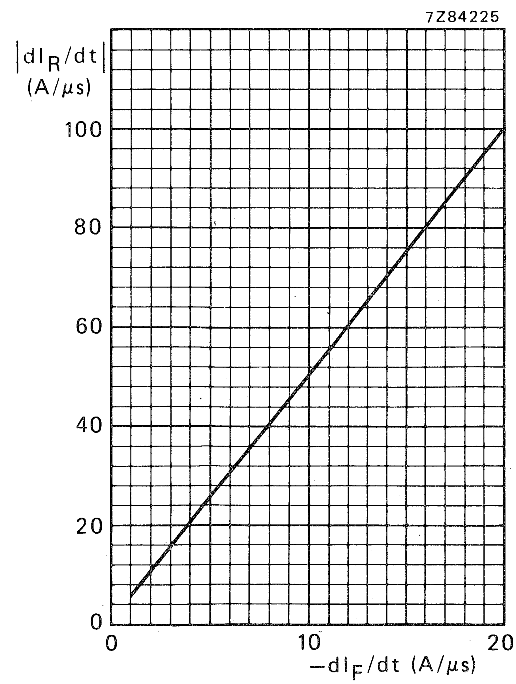


Fig. 7.

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.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$

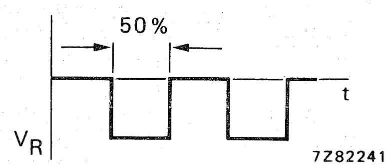


Fig. 6 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

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.

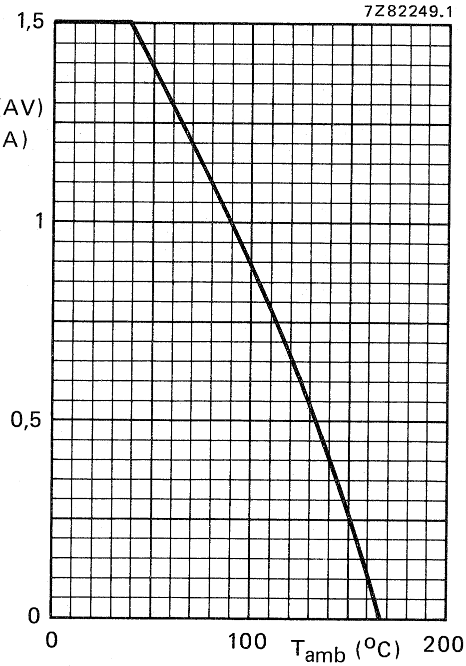


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

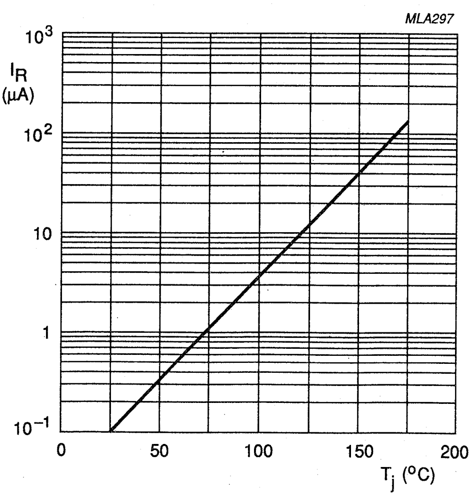


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM\,max}$. Typical values.

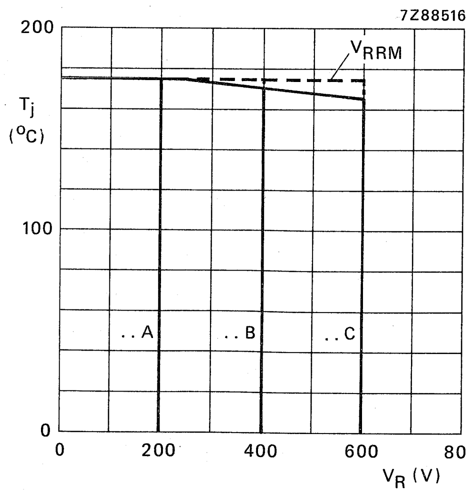


Fig. 10 Maximum values junction temperature as a function of reverse voltage.

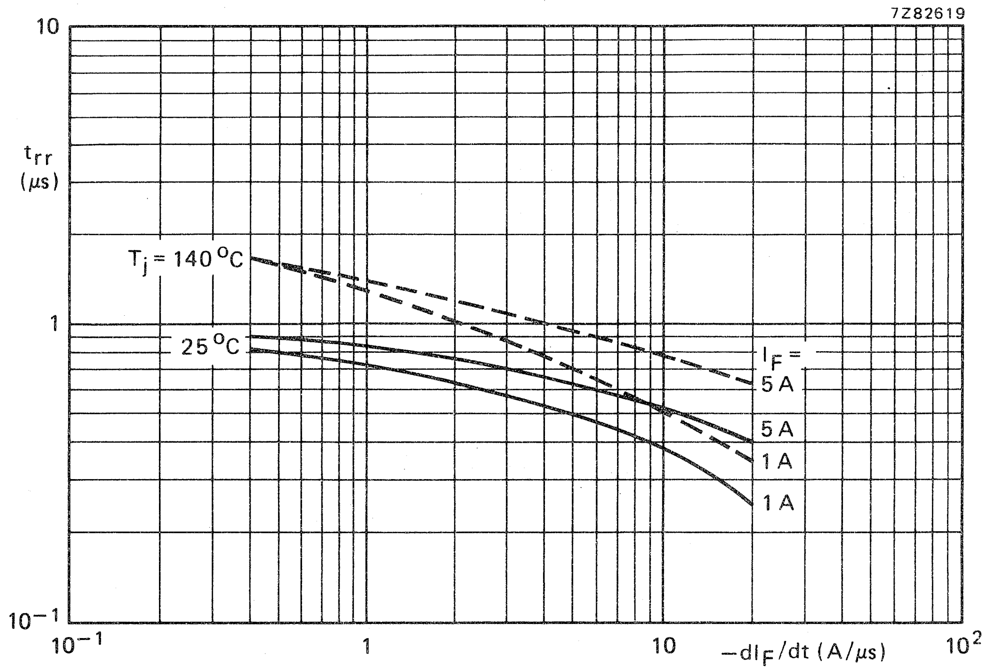


Fig. 11 Maximum values; for definitions see Fig. 4.

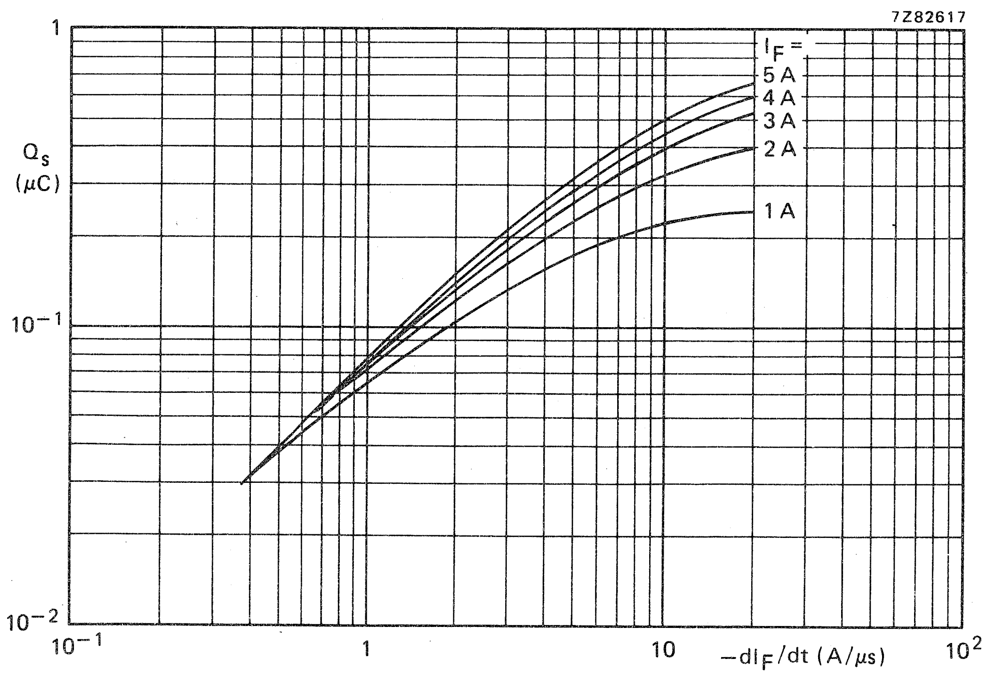


Fig. 12 Maximum values; T_j = 25 °C. For definitions see Fig. 4.

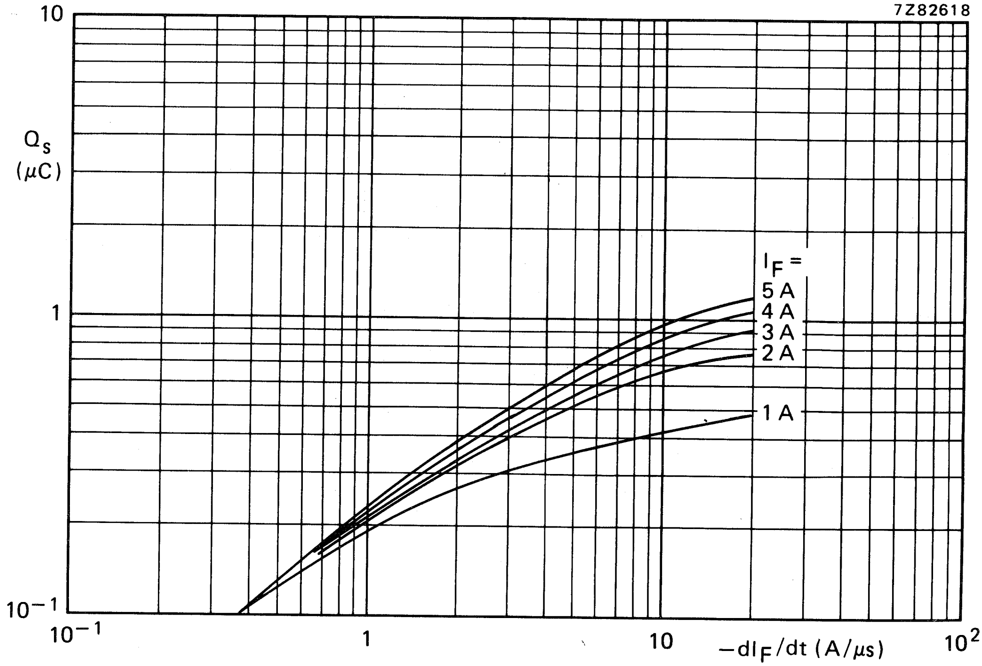


Fig. 13 Maximum values; T_j = 140 °C. For definitions see Fig. 4.

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).

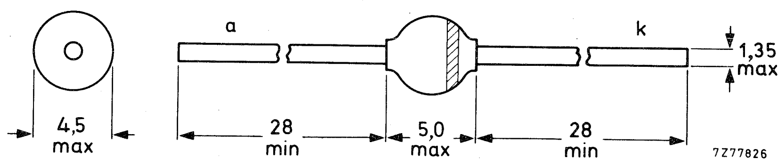
QUICK REFERENCE DATA

			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

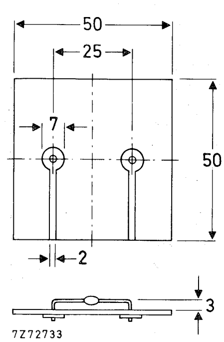


Fig. 2 Mounted on a printed-circuit board.

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

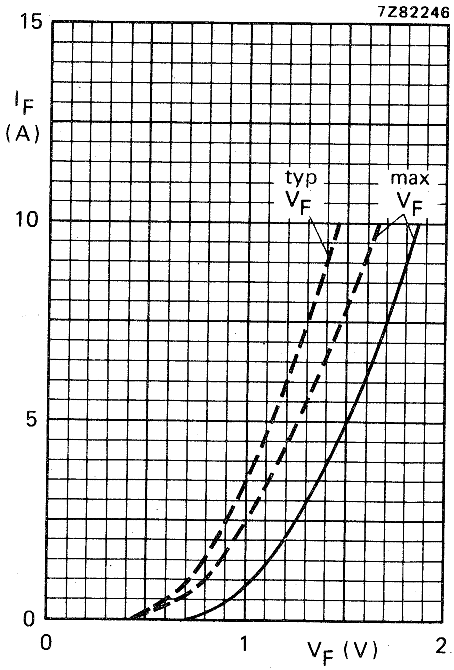


Fig. 3 ——— T_j = 25 °C; – – – T_j = $T_{j\,max}$

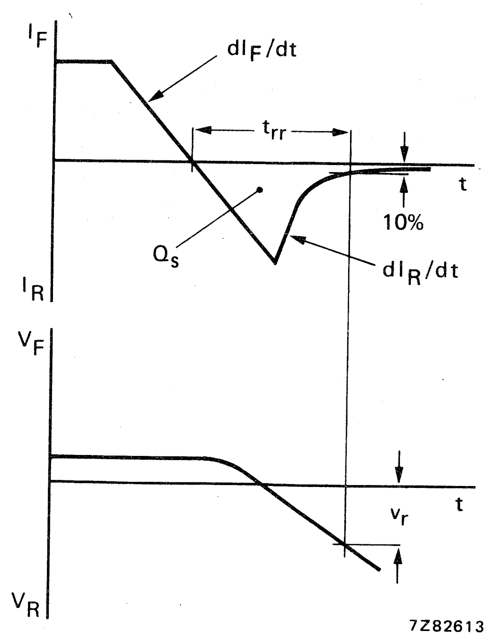


Fig. 4 Definitions.

* Measured under pulse conditions to avoid excessive dissipation.

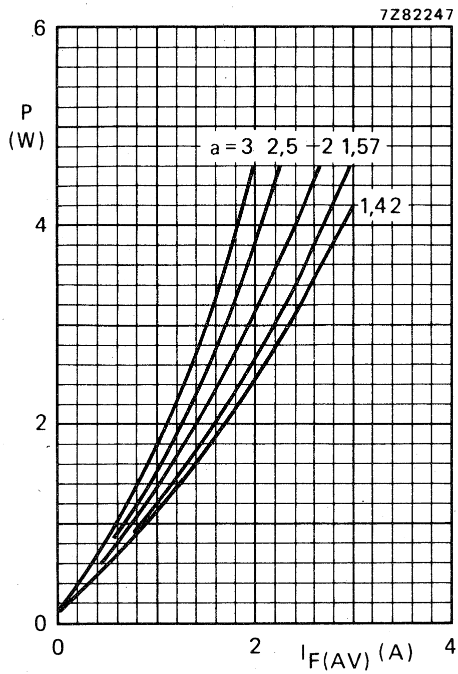
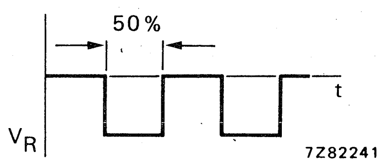


Fig. 5 Steady state power dissipation (forward plus leakage current) excluding switching losses as a function of the average forward current.

The graph is for switched-mode application.

$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$



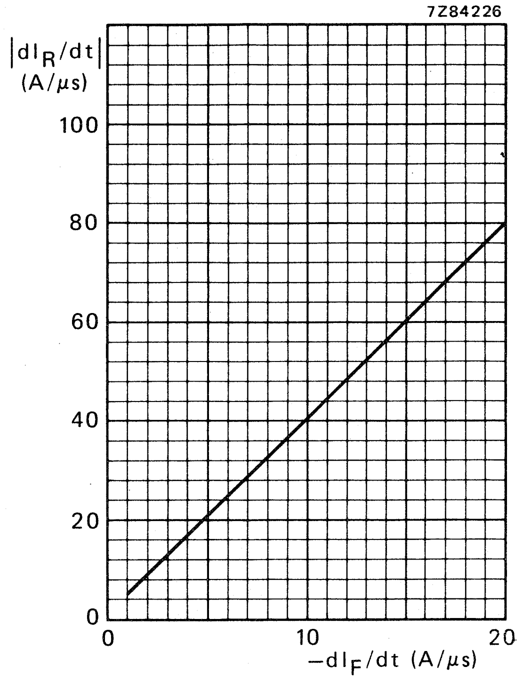


Fig. 6 Maximum slope of reverse recovery current. T_j = 25 °C.

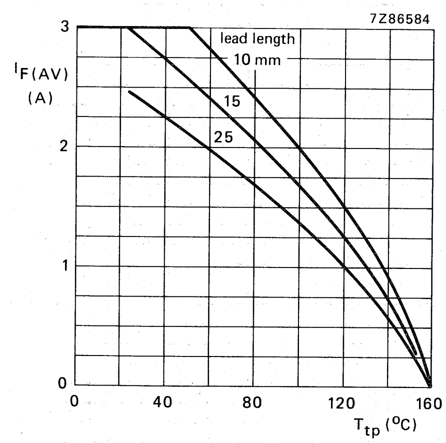


Fig. 7 Maximum average forward current as a function of the tie-point temperature; the curves include losses due to reverse leakage.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57 .

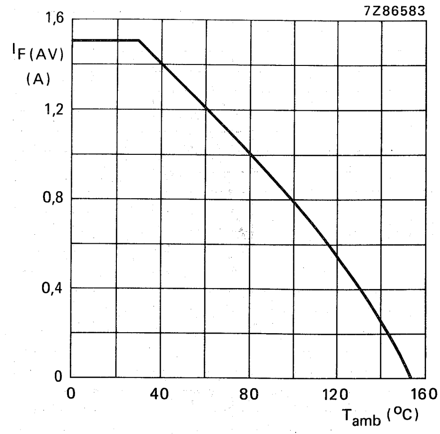


Fig. 8 Maximum average forward current as a function of the ambient temperature; the curve includes losses due to reverse leakage. Mounting method see Fig. 2.

The graph is for switched-mode application; $V_R = V_{RRMmax}$; δ = 50%; a = 1,57.

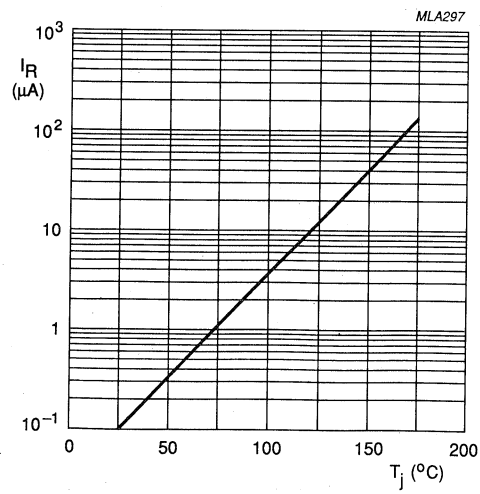


Fig. 9 Reverse current as a function of junction temperature. $V_R = V_{RRM}$ max. Typical values.

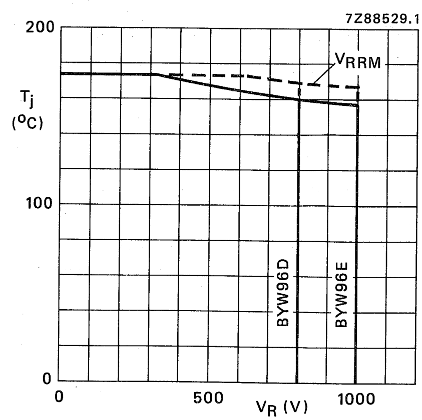


Fig. 10 Maximum values junction temperature as a function of reverse voltage.

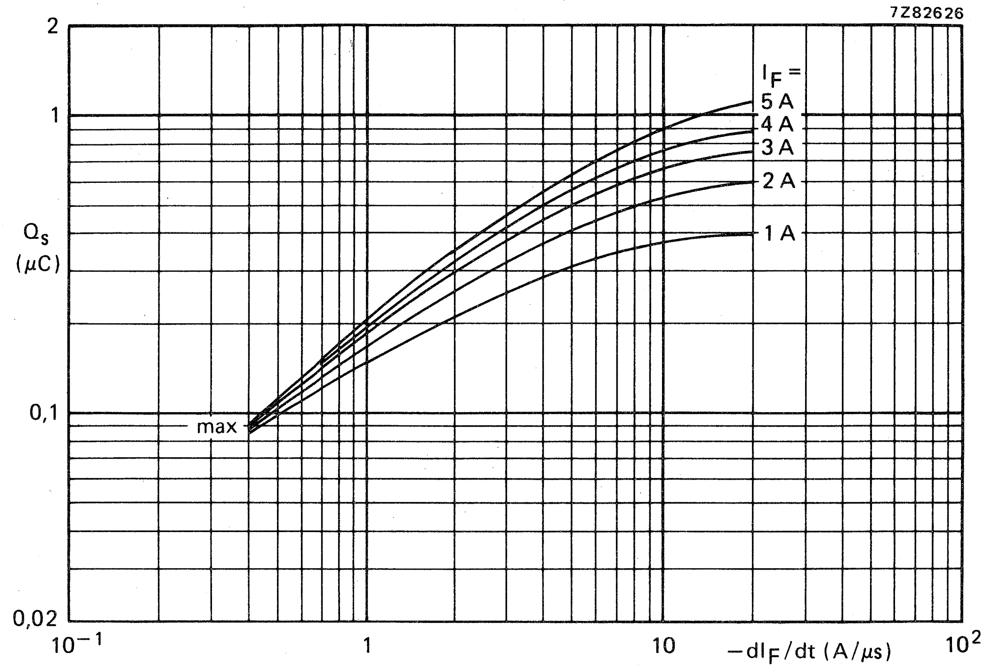


Fig. 11 Maximum values at T_j = 25 °C (see also Fig. 4).

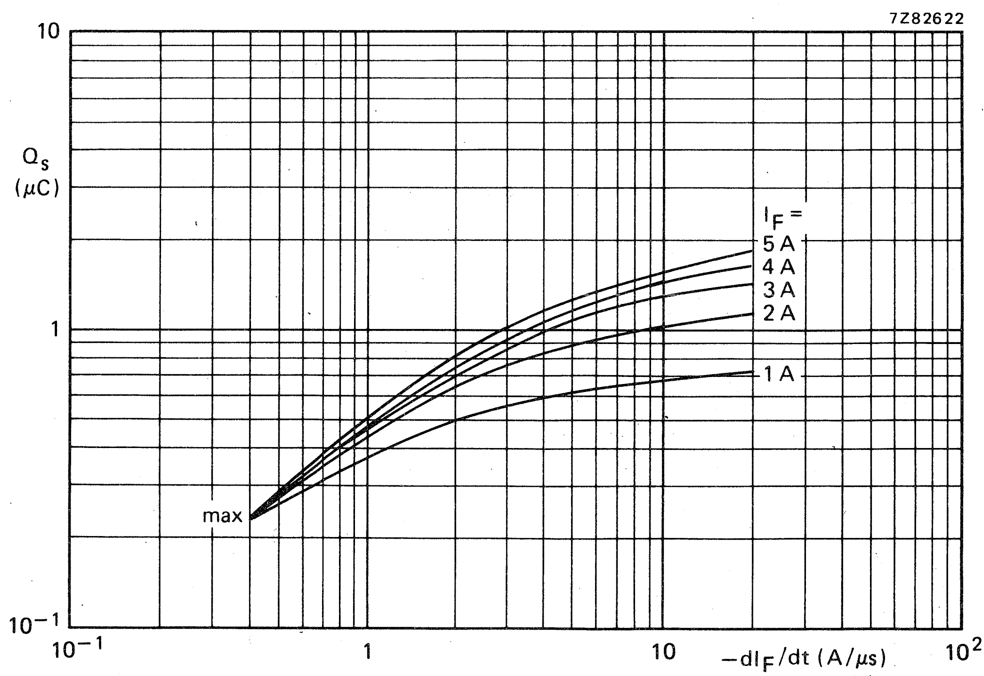


Fig. 12 Maximum values at T_j = 140 °C (see also Fig. 4).

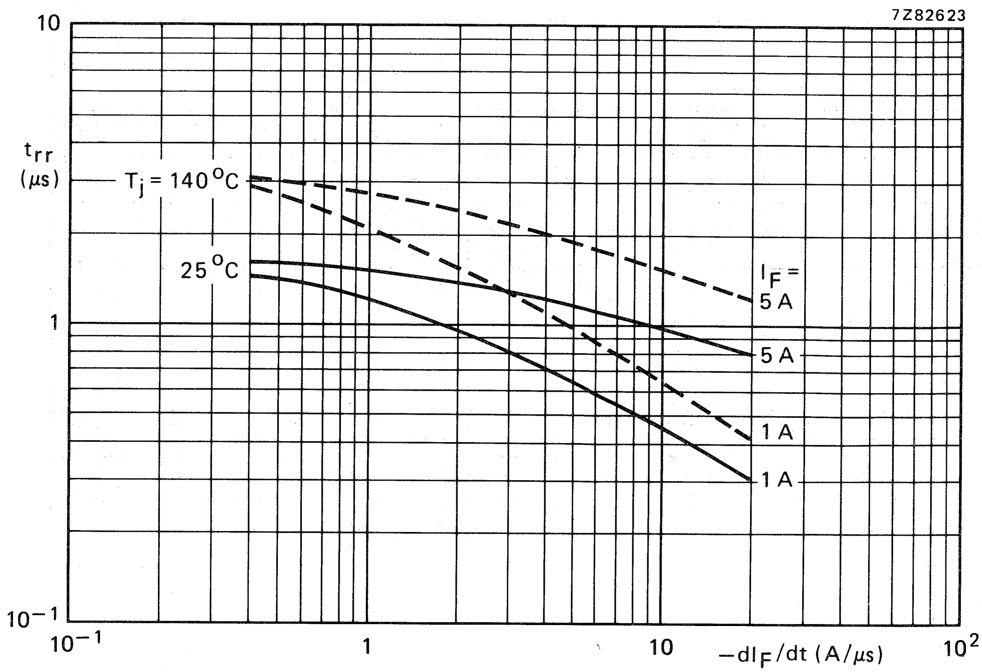


Fig. 13 Maximum values. For definitions see Fig. 4.

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).

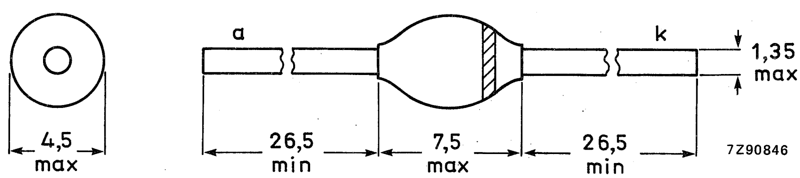
QUICK REFERENCE DATA

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.

*See also "Custom made E.H.T. stacks" in section "General".

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

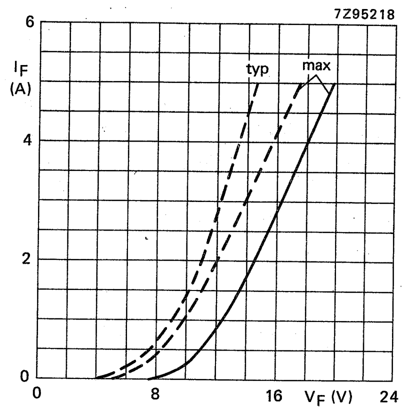


Fig. 2 ——— T_j = 25 °C
------------- T_j = 165 °C.

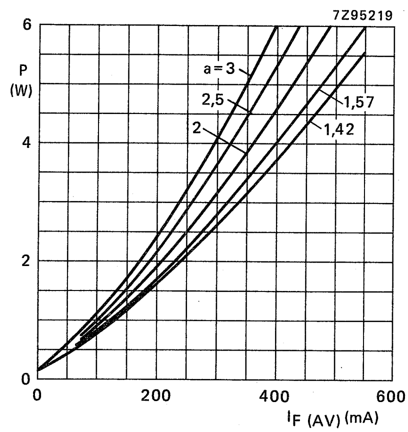


Fig. 3 Steady-state power dissipation (forward plus leakage current) versus average forward current; $V_R = V_{RWMmax}$; $\delta = 50\%$; $a = I_{F(RMS)}/I_{F(AV)}$.

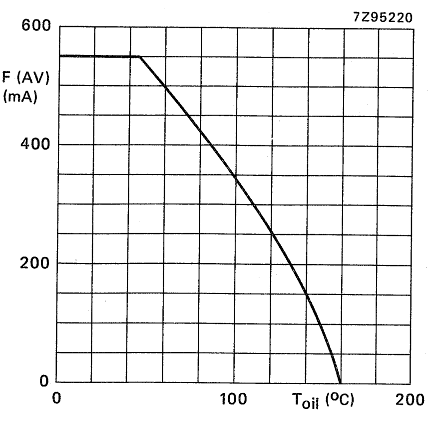


Fig. 4 Maximum average forward current versus oil temperature; curve includes losses due to reverse leakage; $V_R = V_{RWMmax}$; $\delta = 50\%$; $a = 1,57$.

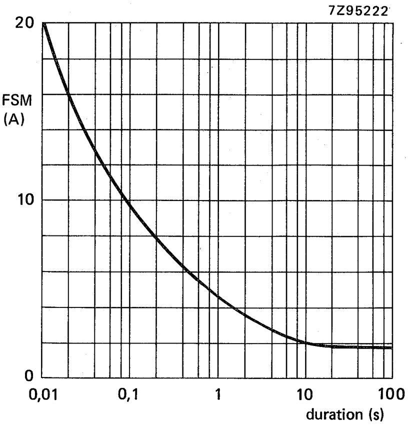
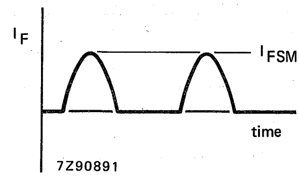


Fig. 5 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz); $V_R = V_{RWMmax}$; T_j = 165 °C prior to surge.



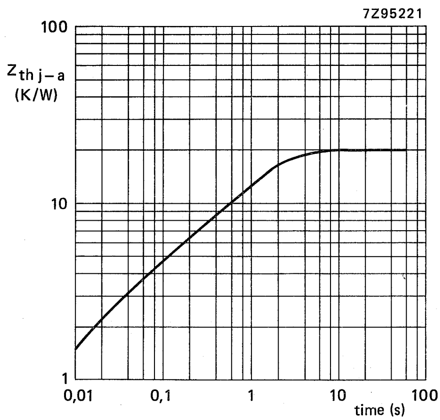


Fig. 6.

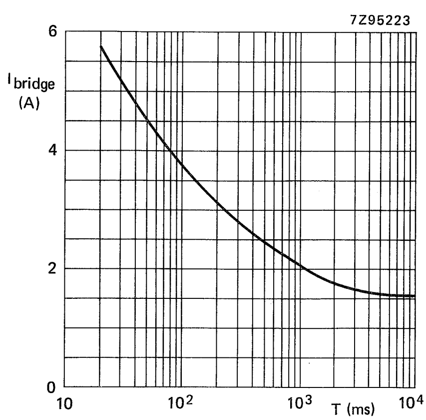
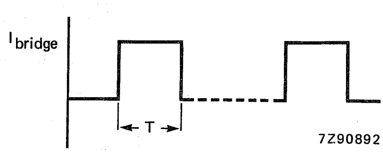


Fig. 7 Maximum permissible output current in a 3-phase rectifier bridge with a minimum time between exposures of 20 s; T_{oil} = 50 °C.



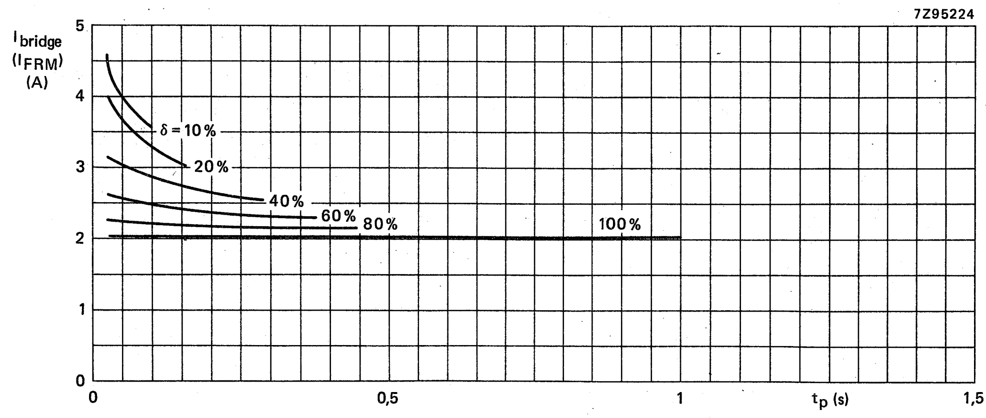


Fig. 8 Maximum current through a 3-phase rectifier bridge versus pulse duration; exposure time T = 1 s; T_{oil} = 50 °C; (see Fig. 10).

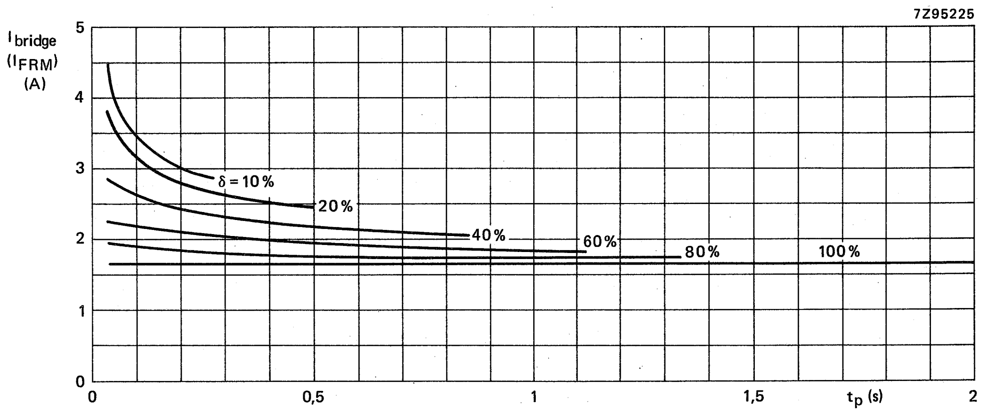


Fig. 9 Maximum current through a 3-phase rectifier bridge versus pulse duration; exposure time T = 3 s; T_{oil} = 50 °C; (see Fig. 10).

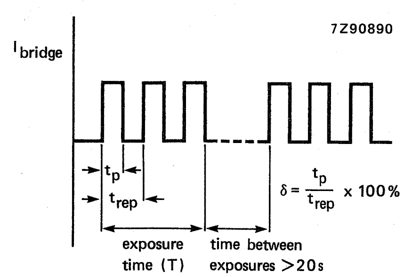


Fig. 10.

EHT avalanche diode BYX110GP

FEATURES

- Glass passivated and supplied in plastic encapsulated envelopes
- Withstands accelerated damp heat test of IEC recommendations 68-2 (test D, severity IV, 6 cycles)
- Withstands flammability test in accordance with UL94V-O
- Capability of absorbing avalanche energy
- Versions with ringtops, "faston" connectors, etc. available on request.

DESCRIPTION

The BYX110GP is an EHT rectifier diode intended for general purpose high voltage rectifying at frequencies up to 400 Hz.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	9	kV
$I_{F(AV)}$	average forward current	350	mA
I_{FSM}	non-repetitive peak forward current	30	A
P_{RSM}	non-repetitive peak reverse power dissipation	6	kW
T_j	junction temperature	150	°C

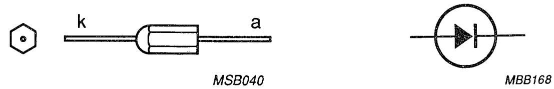


Fig.1 Simplified outline (SOD101) and symbol.

LIMITING VALUES

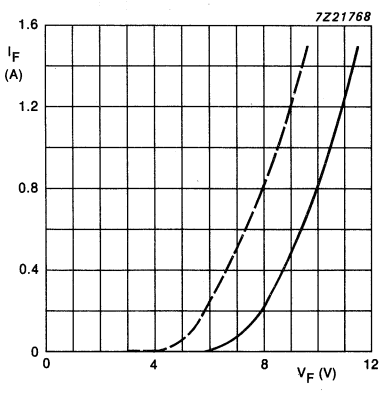
In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage		–	8	kV
V_{RWM}	crest working reverse voltage		–	8	kV
V_{RRM}	repetitive peak reverse voltage	$\delta \leq 0.01$	–	9	kV
$I_{F(AV)}$	average forward current	averaged over any 20 ms period	–	350	mA
I_{FRM}	repetitive peak forward current	t = 10 ms; half sinewave; $T_j = T_{j\ max}$ prior to surge	–	30	A
P_{RSM}	non-repetitive peak reverse power dissipation	t = 10 µs; triangular pulse; $T_j = T_{j\ max}$ prior to surge	–	6	kW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

CHARACTERISTICS

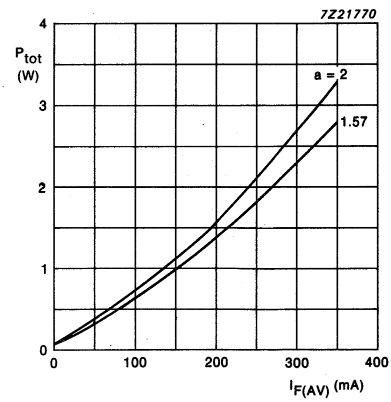
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
$V_{(BR)R}$	reverse breakdown voltage	I_R = 100 µA	9.5	–	kV
V_F	forward voltage	I_F = 350 mA	–	8.5	V
I_{RM}	peak reverse current	V_R = 8 kV	–	1	µA
		V_R = 8 kV; T_j = 150 °C	–	25	µA



Solid line = T_j at 25 °C.
Dotted line = $T_{j\ max}$.

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



'a' = form factor = $I_{F(RMS)}/I_{F(AV)}$.

Fig.3 Total steady state dissipation (forward plus leakage losses) as a function of forward current.

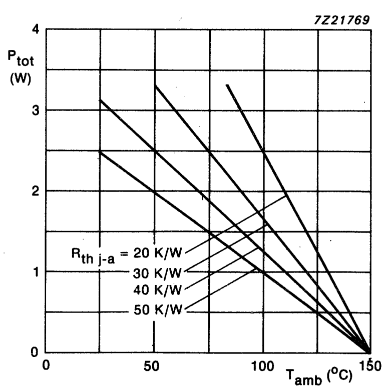
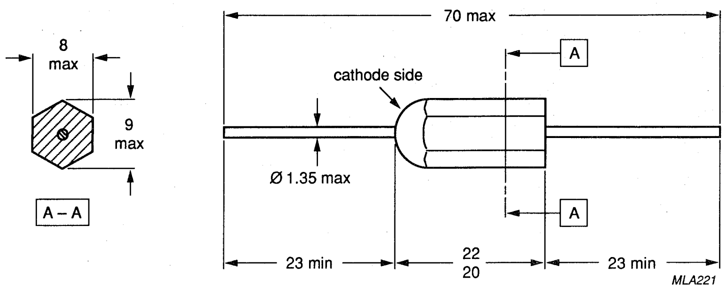


Fig.4 Interrelation between the total dissipation (derived from Fig.3) and the maximum permissible ambient temperature.

PACKAGE OUTLINE



Dimensions in mm.

The rounded end indicates the cathode.

The sealing of the plastic envelope withstands the accelerated damp heat test of IEC recommendation 68-2 (test D, severity IV, 6 cycles).

Versions with ringtops and/or receptacles on the leads are available on request.

Fig.5 SOD101.

EHT car ignition diode BYX120G

DESCRIPTION

EHT rectifier diodes in glass envelopes intended for use in high-voltage car ignition systems. The devices are designed to cope with the extreme temperature requirements in automotive applications and are capable of absorbing avalanche energy.

Because of the small envelope, the diode should be used in a suitable insulating medium.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	–	3	kV
$V_{(BR)R}$	reverse avalanche breakdown voltage	3.5	–	kV
$I_{F(AV)}$	average forward current	–	100	mA
P_{RSM}	non-repetitive peak reverse power dissipation	–	3	kW
T_{amb}	ambient operating temperature	–	150	°C
		–	180	°C
t_{rr}	reverse recovery time	–	5	µs

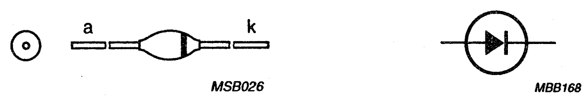


Fig.1 Simplified outline (SOD88A) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		–	3	kV
V_{RWM}	crest working reverse voltage		–	3	kV
$I_{F(AV)}$	average forward current		–	100	mA
I_{FRM}	repetitive peak forward current		–	5	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms; half sinewave; $T_j = T_{j\ max}$ prior to surge	–	15	A
P_{RSM}	non-repetitive peak reverse power dissipation	t = 10 µs; triangular pulse; $T_j = T_{j\ max}$ prior to surge	–	3	kW
T_{stg}	storage temperature range		−65	200	°C
T_{amb}	ambient operating temperature	continuous	–	150	°C
		max. 30 mins; note 1	–	180	°C

Note

1. For a maximum operating time of 30 minutes, a junction temperature of max. 200 °C is allowed.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient	$T_{amb} = T_{leads}$	55 K/W

CHARACTERISTICS

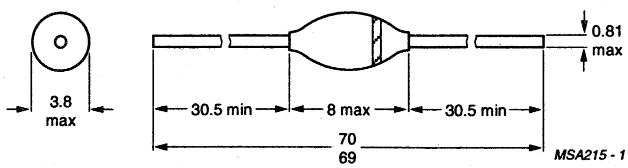
T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 0.1 mA	–	4.4	V
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 100 µA	3.5	–	kV
I_R	reverse current	V_R = 2 kV; T_j = 180 °C	–	75	µA
t_{rr}	reverse recovery time	note 1	–	5	µs

Note

1. When switched from I_F = 0.5 A to I_R = 1 A, measured at I_R = 0.25 A.

PACKAGE OUTLINE



Dimensions in mm.

Fig.2 SOD88A.

Voltage regulator diodes

BZD23 series

DESCRIPTION

Glass-passivated diodes in hermetically sealed axial-leaded implosion diode (ID) glass envelopes. They are intended for use as voltage regulator and transient suppressor diodes in medium power regulation and transient suppression circuits.

The series consists of BZD23-C3V6 to C6V8 and BZD23-C7V5 to C510, in the normalized E24 range.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	NOM.	MAX.	UNIT
V_Z	voltage regulator working voltage range			
	C3V6 - C6V8	3.6 to 6.8	–	V
	C7V5 - C270	7.5 to 270	–	V
P_{tot}	total power dissipation			
	C3V6 - C6V8	–	2	W
	C7V5 - C510	–	2.5	W
V_R	transient suppressor stand-off voltage			
	C7V5 - C510	6.2 to 430	–	V
P_{RSM}	non-repetitive peak reverse power dissipation	–	300	W

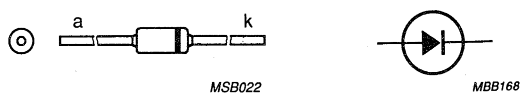


Fig.1 Simplified outline (SOD81) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

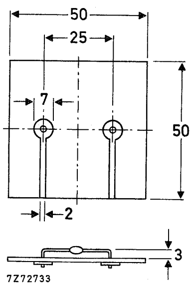
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
P_{tot}	total power dissipation	T_{tp} = 25 °C; lead length 10 mm			
	C3V6 - C6V8		–	2	W
	C7V5 - C510		–	2.5	W
		T_{amb} = 55 °C; PCB mounting; see Fig.2			
	C3V6 - C6V8		–	1	W
	C7V5 - C510		–	1	W
P_{RSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs, square pulse; T_j = 25 °C (prior to surge); see also Fig.7			
	C3V6 - C6V8	see also Fig.8	–	300	W
	C7V5 - C510		–	300	W
		T_j = 25 °C (prior to surge); waveform 10/1000 exponential pulse; see Fig.3			
	C7V5 - C510		–	150	W
T_{stg}	storage temperature range				
	C3V6 - C6V8		−65	200	°C
	C7V5 - C510		−65	175	°C
T_j	junction temperature				
	C3V6 - C6V8		–	200	°C
	C7V5 - C510		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tie-point	note 1	
	C3V6 - C6V8		87 K/W
	C7V5 - C510		60 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 2	
	C3V6 - C6V8		145 K/W
	C7V5 - C510		120 K/W

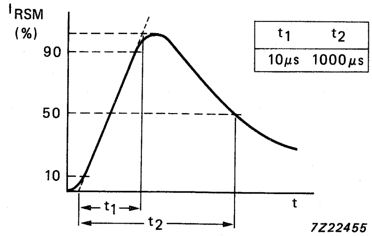
Notes

1. Lead length 10 mm.
2. Mounted on a 1.5 mm thick epoxy-glass printed circuit board; thickness of copper ≥ 40 µm; see Fig.2.



Dimensions in mm.

Fig.2 Printed circuit board mounting.



t_1 = 10 μs.

t_2 = 1000 μs.

Fig.3 Current pulse (in accordance with IEC 60-2, section 6).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 0.2 A; note 1		
	C3V6 - C6V8		1.2	V
	C7V5 - C510		1.2	V

Note

1. Measured under pulse conditions to avoid excessive dissipation.

CHARACTERISTICS

When used as voltage regulator diodes.

BZD23 XXXXX	WORKING VOLTAGE V_Z (V)			DIFFERENTIAL RESISTANCE r_{diff} (Ω)		TEMPERATURE COEFFICIENT S_Z (%/K)		TEST CURRENT I_Z (mA)	REVERSE CURRENT at REVERSE VOLTAGE I_R (μA)	V_R (V)
	MIN.	NOM.	MAX.	TYP.	MAX.	MIN.	MAX.		MAX.	
C3V6	3.4	3.6	3.8	4	8	−0.14	−0.04	100	100	1
C3V9	3.7	3.9	4.1	4	8	−0.14	−0.04	100	50	1
C4V3	4.0	4.3	4.6	4	7	−0.12	−0.02	100	25	1
C4V7	4.4	4.7	5	3	7	−0.10	0	100	10	1
C5V1	4.8	5.1	5.4	3	6	−0.08	−0.02	100	5	1
C5V6	5.2	5.6	6	2	4	−0.04	0.04	100	10	2
C6V2	5.8	6.2	6.6	2	3	−0.01	0.06	100	5	2
C6V8	6.4	6.8	7.2	1	3	0	0.07	100	10	3
C7V5	7	7.5	7.9	1	2	0	0.07	100	50	3
C8V2	7.7	8.2	8.7	1	2	0.03	0.08	100	10	3
C9V1	8.5	9.1	9.6	2	4	0.03	0.08	50	10	5
C10	9.4	10	10.6	2	4	0.05	0.09	50	7	7.5
C11	10.4	11	11.6	4	7	0.05	0.10	50	3	8.2
C12	11.4	12	12.7	4	7	0.05	0.10	50	2	9.1
C13	12.4	13	14.1	5	10	0.05	0.10	50	1	10
C15	13.8	15	15.6	5	10	0.05	0.10	50	1	11
C16	15.3	16	17.1	6	15	0.06	0.11	25	1	12
C18	16.8	18	19.1	6	15	0.06	0.11	25	1	13
C20	18.8	20	21.2	6	15	0.06	0.11	25	1	15
C22	20.8	22	23.3	6	15	0.06	0.11	25	1	16
C24	22.8	24	25.6	7	15	0.06	0.11	25	1	18
C27	25.1	27	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

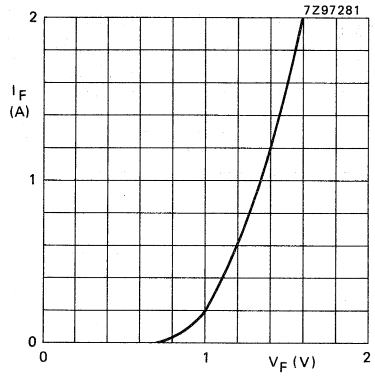
BZD23 XXXXX	WORKING VOLTAGE V_Z (V)			DIFFERENTIAL RESISTANCE r_{diff} (Ω)		TEMPERATURE COEFFICIENT S_Z (%/K)		TEST CURRENT	REVERSE CURRENT at REVERSE VOLTAGE	
	MIN.	NOM.	MAX.	TYP.	MAX.	MIN.	MAX.	I_Z (mA)	I_R (μA) MAX.	V_R (V)
C91	85	91	96	60	200	0.09	0.13	5	1	68
C100	94	100	106	60	200	0.09	0.13	5	1	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.

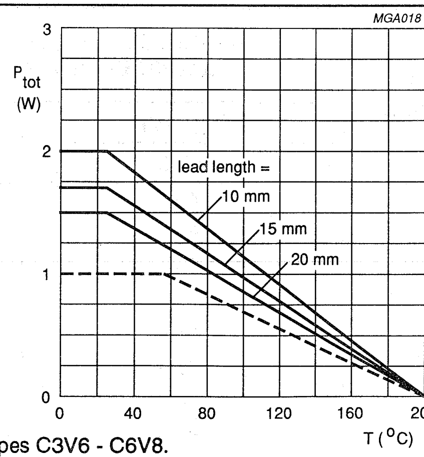
BZD23 XXXXX	CLAMPING VOLTAGE at NON-REPETITIVE PEAK (10/1000 PULSE) REVERSE CURRENT		REVERSE CURRENT AT RECOMMENDED STAND-OFF VOLTAGE	
	$V_{(CL)R}$ (V) MAX.	I_{RSM} (A)	I_R (μA) MAX.	V_R (V)
C7V5	11.3	13.3	1500	6.2
C8V2	12.3	12.2	1200	6.8
C9V1	13.3	11.3	100	7.5
C10	14.8	10.1	20	8.2
C11	15.7	9.6	5	9.1
C12	17	8.8	5	10
C13	18.9	7.9	5	11
C15	20.9	7.2	5	12
C16	22.9	6.6	5	13
C18	25.6	5.9	5	15
C20	28.4	5.3	5	16
C22	31	4.8	5	18
C24	33.8	4.4	5	20
C27	38.1	3.9	5	22
C30	42.2	3.6	5	24

BZD23 XXXXX	CLAMPING VOLTAGE at NON-REPETITIVE PEAK (10/1000 PULSE) REVERSE CURRENT		REVERSE CURRENT AT RECOMMENDED STAND-OFF VOLTAGE	
	$V_{(CL)R}$ (V)	I_{RSM} (A)	I_R (μA)	V_R (V)
	MAX.		MAX.	
C33	46.2	3.2	5	27
C36	50.1	3	5	30
C39	54.1	2.8	5	33
C43	60.7	2.5	5	36
C47	65.5	2.3	5	39
C51	70.8	2.1	5	43
C56	78.6	1.9	5	47
C62	86.5	1.7	5	51
C68	94.4	1.6	5	56
C75	103.5	1.5	5	62
C82	114	1.3	5	68
C91	126	1.2	5	75
C100	139	1.1	5	82
C110	152	1	5	91
C120	167	0.90	5	100
C130	185	0.81	5	110
C150	204	0.73	5	120
C160	224	0.67	5	130
C180	249	0.60	5	150
C200	276	0.54	5	160
C220	305	0.50	5	180
C240	336	0.45	5	200
C270	380	0.40	5	220
C300	419	0.36	5	240
C330	459	0.33	5	270
C360	498	0.30	5	300
C390	537	0.28	5	330
C430	603	0.25	5	360
C470	655	0.23	5	390
C510	707	0.21	5	430



T_j = 25 °C.

Fig.4 Forward current as a function of forward voltage, typical values.

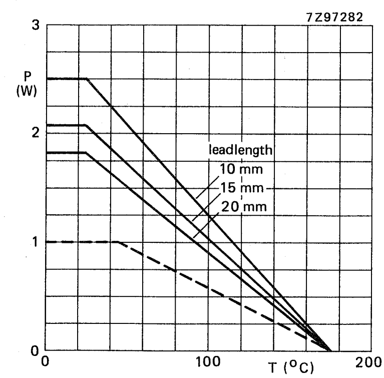


Types C3V6 - C6V8.

Solid line = tie-point temperature.

Dotted line = ambient temperature with device mounted as shown in Fig.2.

Fig.5 Maximum total power dissipation as a function of temperature.

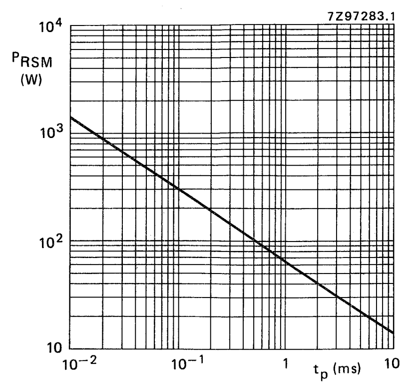


Types C7V5 - C270.

Solid line = tie-point temperature.

Dotted line = ambient temperature with device mounted as shown in Fig.2.

Fig.6 Maximum total power dissipation as a function of temperature.



T_j = 25 °C.

Fig.7 Maximum non-repetitive peak reverse power dissipation (square pulse), prior to surge.

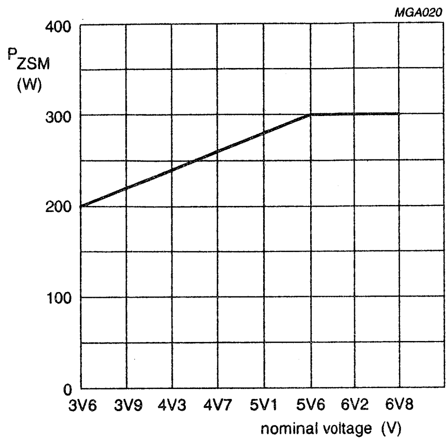
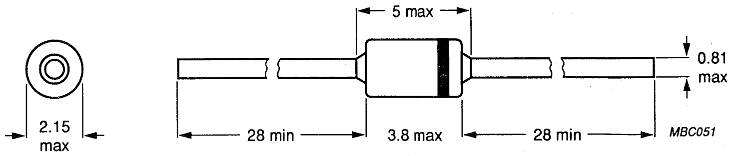


Fig.8 Non-repetitive peak reverse power dissipation as a function of nominal voltage.

PACKAGE OUTLINE



Dimensions in mm.

Marking band indicates the cathode.

Fig.9 SOD81.

DESCRIPTION

Glass-passivated diodes in hermetically sealed leadless surface mounted implosion diode (SMID) glass envelopes. They are intended for use as voltage regulator and transient suppressor diodes in medium power regulation and transient suppression circuits.

The series consists of BZD27-C3V6 to C6V8 and BZD27-C7V5 to C510, in the normalized E24 range.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	NOM.	MAX.	UNIT
V_Z	voltage regulator working voltage range			
	C3V6 - C6V8	3.6 to 6.8	–	V
	C7V5 - C270	7.5 to 270	–	V
P_{tot}	total power dissipation			
	C3V6 - C6V8	–	1.7	W
	C7V5 - C510	–	2.3	W
V_R	transient suppressor stand-off voltage			
	C7V5 - C510	6.2 to 430	–	V
P_{RSM}	non-repetitive peak reverse power dissipation	–	300	W

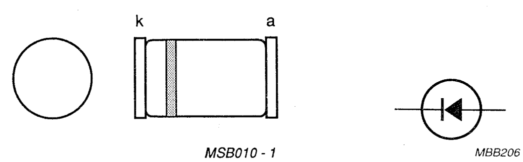


Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

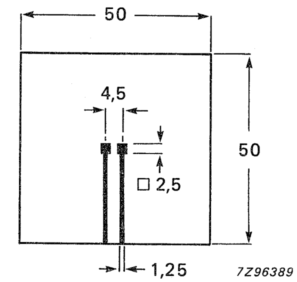
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
P_{tot}	total power dissipation	T_{tp} = 105 °C			
	C3V6 - C6V8		–	1.7	W
	C7V5 - C510		–	2.3	W
		PCB mounting; see Fig.2			
	C3V6 - C6V8	T_{amb} = 60 °C	–	0.8	W
	C7V5 - C510	T_{amb} = 55 °C	–	0.8	W
P_{RSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs, square pulse; T_j = 25 °C (prior to surge); see also Fig.7			
	C3V6 - C6V8	see also Fig.8	–	300	W
	C7V5 - C510		–	300	W
		T_j = 25 °C (prior to surge); waveform 10/1000 exponential pulse; see Fig.3			
	C7V5 - C510		–	150	W
T_{stg}	storage temperature range				
	C3V6 - C6V8		−65	200	°C
	C7V5 - C510		−65	175	°C
T_j	junction temperature				
	C3V6 - C6V8		–	200	°C
	C7V5 - C510		–	175	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tie-point		
	C3V6 - C6V8		55 K/W
	C7V5 - C510		30 K/W
$R_{th\ j\text{-}a}$	from junction to ambient		
	C3V6 - C6V8	note 1	175 K/W
	C7V5 - C510		150 K/W

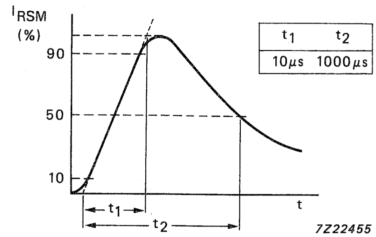
Note

1. Mounted on a 1.5 mm thick epoxy-glass printed circuit board; thickness of copper ≥ 40 µm; see Fig.2.



Dimensions in mm.

Fig.2 Printed circuit board mounting.



t_1 = 10 μs.
t_2 = 1000 μs.

Fig.3 Current pulse (in accordance with IEC 60-2, section 6).

CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MAX.	UNIT
V_F	forward voltage	I_F = 0.2 A; note 1		
	C3V6 - C6V8		1.2	V
	C7V5 - C510		1.2	V

Note

1. Measured under pulse conditions to avoid excessive dissipation.

CHARACTERISTICS

When used as voltage regulator diodes.

BZD27 XXXXX	WORKING VOLTAGE V_Z (V)			DIFFERENTIAL RESISTANCE r_{diff} (Ω)		TEMPERATURE COEFFICIENT S_Z (%/K)		TEST CURRENT	REVERSE CURRENT at REVERSE VOLTAGE	
	MIN.	NOM.	MAX.	TYP.	MAX.	MIN.	MAX.	I_Z (mA)	I_R (μA) MAX.	V_R (V)
C3V6	3.4	3.6	3.8	4	8	−0.14	−0.04	100	100	1
C3V9	3.7	3.9	4.1	4	8	−0.14	−0.04	100	50	1
C4V3	4.0	4.3	4.6	4	7	−0.12	−0.02	100	25	1
C4V7	4.4	4.7	5	3	7	−0.10	0	100	10	−
C5V1	4.8	5.1	5.4	3	6	−0.08	−0.02	100	5	1
C5V6	5.2	5.6	6	2	4	−0.04	0.04	100	10	2
C6V2	5.8	6.2	6.6	2	3	−0.01	0.06	100	5	2
C6V8	6.4	6.8	7.2	1	3	0	0.07	100	10	3
C7V5	7	7.5	7.9	1	2	0	0.07	100	50	3
C8V2	7.7	8.2	8.7	1	2	0.03	0.08	100	10	3
C9V1	8.5	9.1	9.6	2	4	0.03	0.08	50	10	5
C10	9.4	10	10.6	2	4	0.05	0.09	50	7	7.5
C11	10.4	11	11.6	4	7	0.05	0.10	50	3	8.2
C12	11.4	12	12.7	4	7	0.05	0.10	50	2	9.1
C13	12.4	13	14.1	5	10	0.05	0.10	50	1	10
C15	13.8	15	15.6	5	10	0.05	0.10	50	1	11
C16	15.3	16	17.1	6	15	0.06	0.11	25	1	12
C18	16.8	18	19.1	6	15	0.06	0.11	25	1	13
C20	18.8	20	21.2	6	15	0.06	0.11	25	1	15
C22	20.8	22	23.3	6	15	0.06	0.11	25	1	16
C24	22.8	24	25.6	7	15	0.06	0.11	25	1	18
C27	25.1	27	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

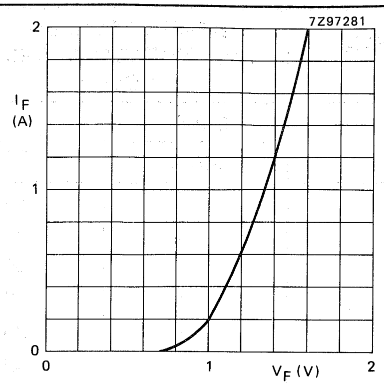
BZD27 XXXXX	WORKING VOLTAGE V_Z (V)			DIFFERENTIAL RESISTANCE r_{diff} (Ω)		TEMPERATURE COEFFICIENT S_Z (%/K)		TEST CURRENT I_Z (mA)	REVERSE CURRENT at REVERSE VOLTAGE I_R (μA)	V_R (V)
	MIN.	NOM.	MAX.	TYP.	MAX.	MIN.	MAX.		MAX.	
C82	77	82	87	30	100	0.08	0.13	10	1	62
C91	85	91	96	60	200	0.09	0.13	5	1	68
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.

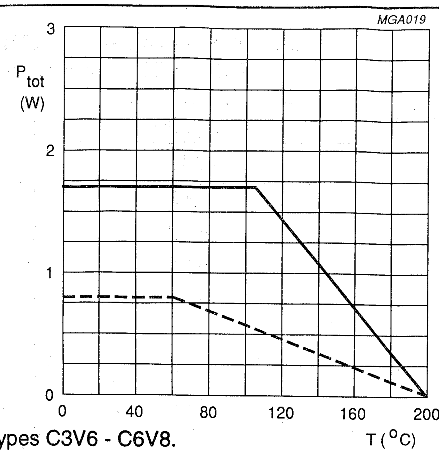
BZD27 XXXXX	CLAMPING VOLTAGE at NON-REPETITIVE PEAK REVERSE CURRENT (10/1000 PULSE) $V_{(CL)R}$ (V)	I_{RSM} (A)	REVERSE CURRENT AT RECOMMENDED STAND-OFF VOLTAGE I_R (μA)	V_R (V)
	MAX.		MAX.	
C7V5	11.3	13.3	1500	6.2
C8V2	12.3	12.2	1200	6.8
C9V1	13.3	11.3	100	7.5
C10	14.8	10.1	20	8.2
C11	15.7	9.6	5	9.1
C12	17	8.8	5	10
C13	18.9	7.9	5	11
C15	20.9	7.2	5	12
C16	22.9	6.6	5	13
C18	25.6	5.9	5	15
C20	28.4	5.3	5	16
C22	31	4.8	5	18
C24	33.8	4.4	5	20
C27	38.1	3.9	5	22

BZD27 XXXXX	CLAMPING VOLTAGE at NON-REPETITIVE PEAK REVERSE CURRENT (10/1000 PULSE)		REVERSE CURRENT AT RECOMMENDED STAND-OFF VOLTAGE	
	$V_{(CL)R}$ (V)	I_{RSM} (A)	I_R (μA)	V_R (V)
	MAX.		MAX.	
C30	42.2	3.6	5	24
C33	46.2	3.2	5	27
C36	50.1	3	5	30
C39	54.1	2.8	5	33
C43	60.7	2.5	5	36
C47	65.5	2.3	5	39
C51	70.8	2.1	5	43
C56	78.6	1.9	5	47
C62	86.5	1.7	5	51
C68	94.4	1.6	5	56
C75	103.5	1.5	5	62
C82	114	1.3	5	68
C91	126	1.2	5	75
C100	139	1.1	5	82
C110	152	1	5	91
C120	167	0.90	5	100
C130	185	0.81	5	110
C150	204	0.73	5	120
C160	224	0.67	5	130
C180	249	0.60	5	150
C200	276	0.54	5	160
C220	305	0.50	5	180
C240	336	0.45	5	200
C270	380	0.40	5	220
C300	419	0.36	5	240
C330	459	0.33	5	270
C360	498	0.30	5	300
C390	537	0.28	5	330
C430	603	0.25	5	360
C470	655	0.23	5	390
C510	707	0.21	5	430



T_j = 25 °C.

Fig.4 Forward current as a function of forward voltage, typical values.

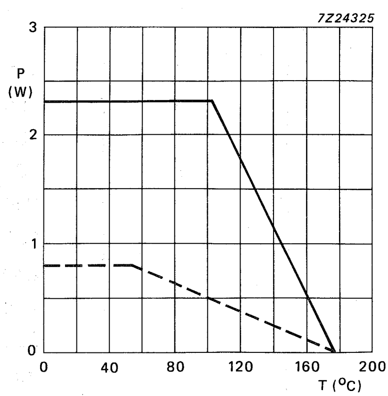


Types C3V6 - C6V8.

Solid line = tie-point temperature.

Dotted line = ambient temperature with device mounted as shown in Fig.2.

Fig.5 Maximum total power dissipation as a function of temperature.

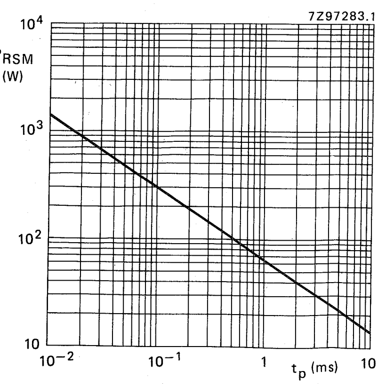


Types C7V5 - C270.

Solid line = tie-point temperature.

Dotted line = ambient temperature with device mounted as shown in Fig.2.

Fig.6 Maximum total power dissipation as a function of temperature.



T_j = 25 °C.

Fig.7 Maximum non-repetitive peak reverse power dissipation (square pulse), prior to surge.

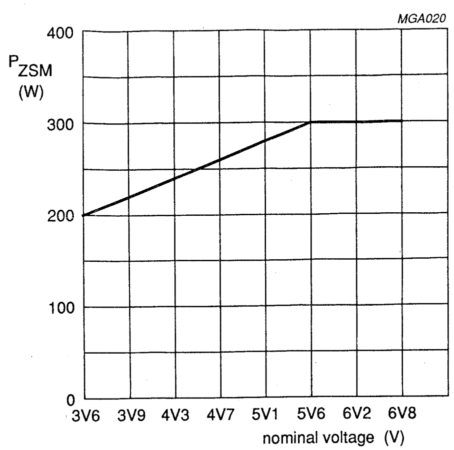
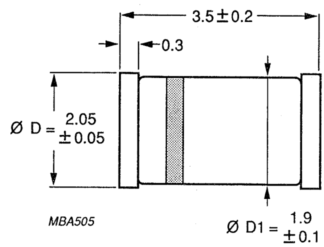


Fig.8 Non-repetitive peak reverse power dissipation as a function of nominal voltage.

PACKAGE OUTLINE



Dimensions in mm.

Marking band indicates the cathode.

Fig.9 SOD87.

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-C510 in the normalized E24 range.

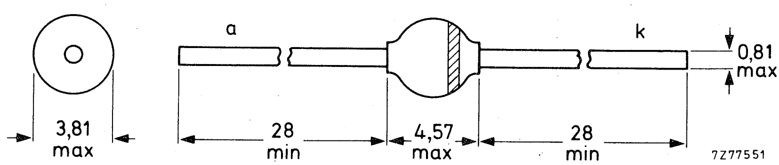
QUICK REFERENCE DATA

			voltage regulator	transient suppressor	
Working voltage range	V_Z	nom.	7.5 to 270		V
Stand-off voltage	V_R			6.2 to 430	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.

Products approved to CECC 50 005-017.

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 (see "Thermal model")	$R_{th\ j\text{-}a}$	=	100 K/W

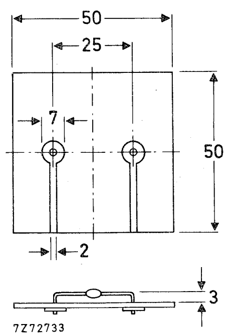


Fig. 2 Mounted on a printed-circuit board.

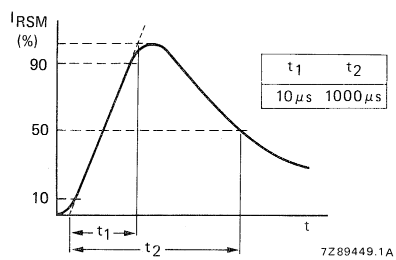


Fig. 3 Current pulse according to IEC 60-2, Section 6.

CHARACTERISTICS

Forward voltage I_F = 0,5 A; T_j = 25 °C	V_F	<	1,2 V

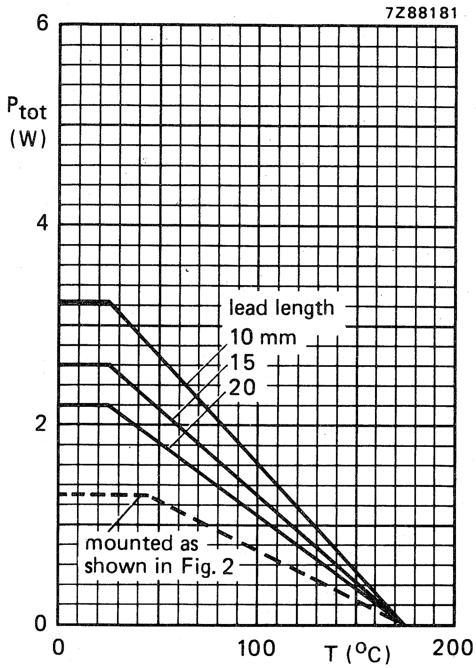


Fig. 4 Maximum total power dissipation as a function of temperature.
——— = T_{tp}; – – – – = T_{amb}; Fig. 2.

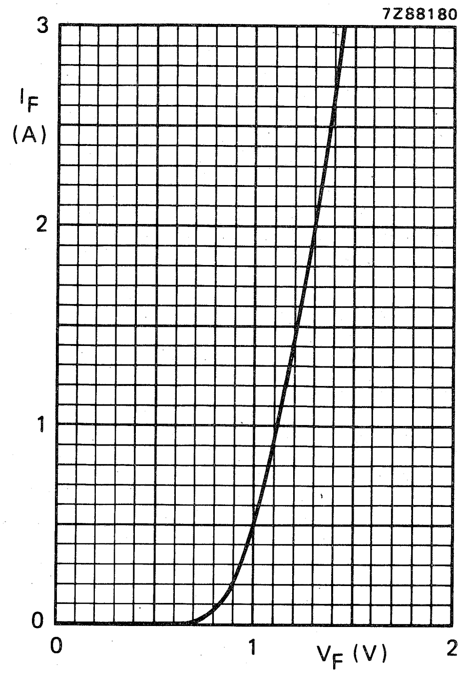


Fig. 5 Typical forward voltage drop T_j = 25 °C.

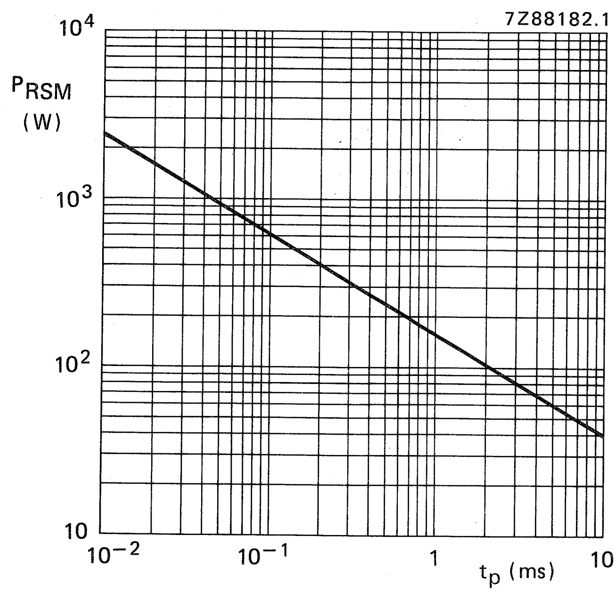


Fig. 6 Maximum non-repetitive peak reverse power dissipation; square current pulse; T_j = 25 °C prior to surge.

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

	breakdown voltage at $V_{(BR)R}$ V	test current I_R mA	clamping voltage (10/1000 pulse) at $V_{(CL)R}$ V	non-repetitive peak reverse current I_{RSM} A	reverse current at recommended stand-off voltage I_R µA	V_R V
BZT03-	min.		max.		max.	
C7V5	7.0	100	11.3	26.5	1500	6.2
C8V2	7.7	100	12.3	24.4	1200	6.8
C9V1	8.5	50	13.3	22.7	50	7.5
C10	9.4	50	14.8	20.3	20	8.2
C11	10.4	50	15.7	19.1	5	9.1
C12	11.4	50	17.0	17.7	5	10
C13	12.4	50	18.9	15.9	5	11
C15	13.8	50	20.9	14.4	5	12
C16	15.3	25	22.9	13.1	5	13
C18	16.8	25	25.6	11.7	5	15
C20	18.8	25	28.4	10.6	5	16
C22	20.8	25	31.0	9.7	5	18
C24	22.8	25	33.8	8.9	5	20
C27	25.1	25	38.1	7.9	5	22
C30	28	25	42.2	7.1	5	24
C33	31	25	46.2	6.5	5	27
C36	34	10	50.1	6.0	5	30
C39	37	10	54.1	5.5	5	33
C43	40	10	60.7	4.9	5	36
C47	44	10	65.5	4.6	5	39
C51	48	10	70.8	4.2	5	43
C56	52	10	78.6	3.8	5	47
C62	58	10	86.5	3.5	5	51
C68	64	10	94.4	3.2	5	56
C75	70	10	103.5	2.9	5	62
C82	77	10	114.0	2.6	5	68
C91	85	5	126	2.4	5	75
C100	94	5	139	2.2	5	82
C110	104	5	152	2.0	5	91
C120	114	5	167	1.8	5	100
C130	124	5	185	1.6	5	110
C150	138	5	204	1.5	5	120
C160	153	5	224	1.3	5	130
C180	168	5	249	1.2	5	150
C200	188	5	276	1.1	5	160
C220	208	2	305	1.0	5	180
C240	228	2	336	0.9	5	200
C270	251	2	380	0.8	5	220
C300	280	2	419	0.72	5	240
C330	310	2	459	0.65	5	270
C360	340	1	498	0.60	5	300
C390	370	1	537	0.56	5	330
C430	400	1	603	0.50	5	360
C470	440	1	655	0.45	5	390
C510	480	1	707	0.42	5	430

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.

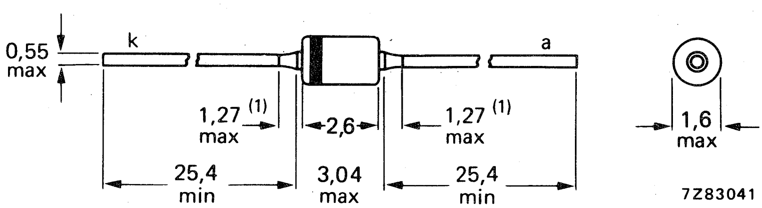
QUICK REFERENCE DATA

			min.	nom.	max.	
Reference voltage at I_Z = 2,0 mA		V_{ref}	5,9	6,2	6,5	V
Temperature coefficient at I_Z = 2,0 mA (see notes 1 and 2 and Fig. 3)	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
Operating ambient temperature		T_{amb}		0 to + 70		°C

MECHANICAL DATA

Dimensions in mm

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



(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)

Working current (DC)	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}	5,9	6,2	6,5	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	$\lvert\Delta V_{ref}\rvert$	<	46,0	mV
BZV11	$\lvert\Delta V_{ref}\rvert$	<	23,0	mV
BZV12	$\lvert\Delta V_{ref}\rvert$	<	9,0	mV
BZV13	$\lvert\Delta V_{ref}\rvert$	<	4,6	mV
BZV14	$\lvert\Delta V_{ref}\rvert$	<	2,3	mV

Temperature coefficient at I_Z = 2,0 mA*
(see notes 1 and 2 on the next page)

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

Differential resistance at I_Z = 2,0 mA	r_{diff}	typ.	20	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:

$$S_Z = \frac{(V_{ref1} - V_{ref2}) \times 100}{(T_{amb2} - T_{amb1}) \times V_{ref\,nom}} \ \%/\text{K}.$$

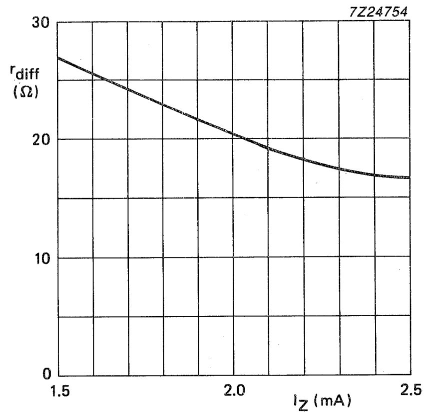


Fig.2 Typical values differential resistance.

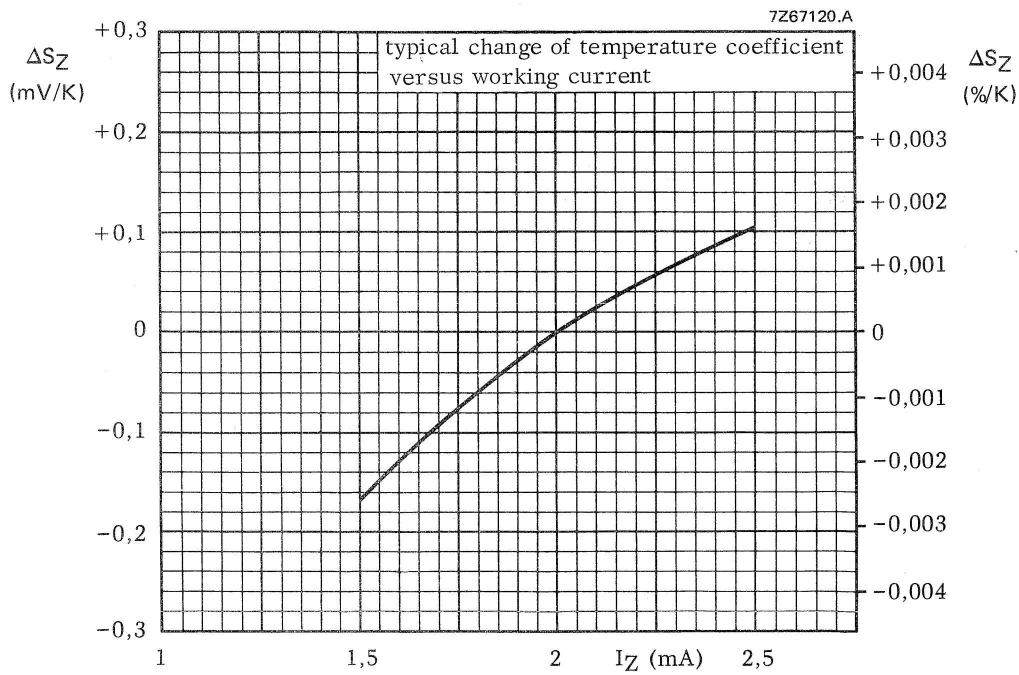


Fig. 3 Typical change of temperature coefficient.

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.

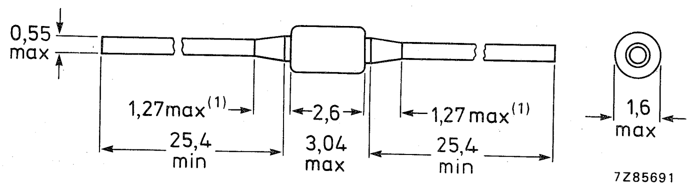
QUICK REFERENCE DATA

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).



The diodes are type-branded, without cathode band.

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 °C prior to surge (Fig. 2)			
t_1/t_2 = 8/20 μs	I_{RSM}	max.	7 A
t_1/t_2 = 10/1000 μs	I_{RSM}	max.	2 A
Total power dissipation			
$T_{amb} < 50$ °C	P_{tot}	max.	400 mW
Non-repetitive peak reverse power dissipation			
(t = 100 μs, rectangular pulse)			
T_j = 25 °C prior to surge	P_{ZSM}	max.	40 W
T_j = 150 °C prior to surge	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 ambient	$R_{th\ j\text{-}a}$	=	0,38 K/mW

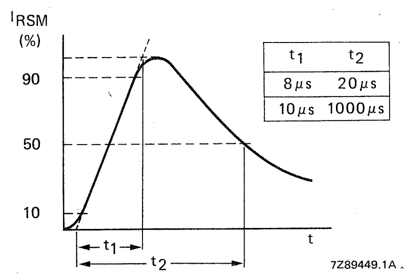


Fig. 2 Current pulse according to IEC 60-2, Section 6.

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

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).

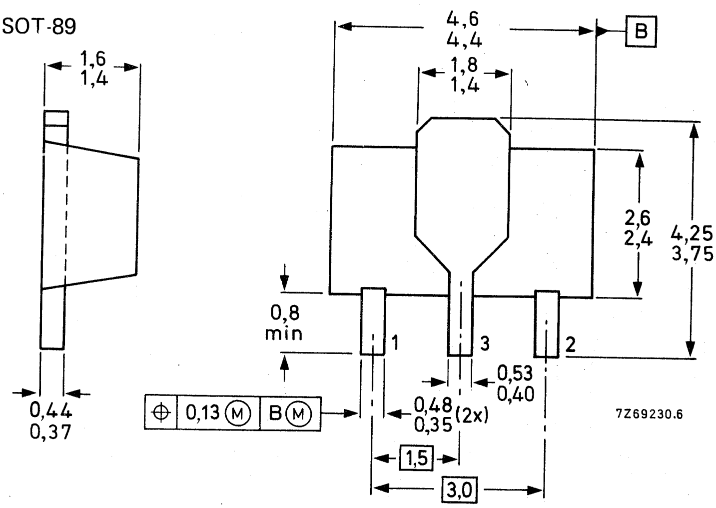
QUICK REFERENCE DATA

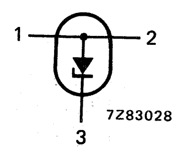
Working voltage range	V_Z	nom.	2,4 to 75	V
Working voltage tolerance (E24 range)			±5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1	W
Junction temperature	T_j	max.	150	°C

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 min.	max.	differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA typ.	max.	temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA min.	typ.	max.	diode capacitance C_d(pF); f = 1 MHz V_R = 0 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	90	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

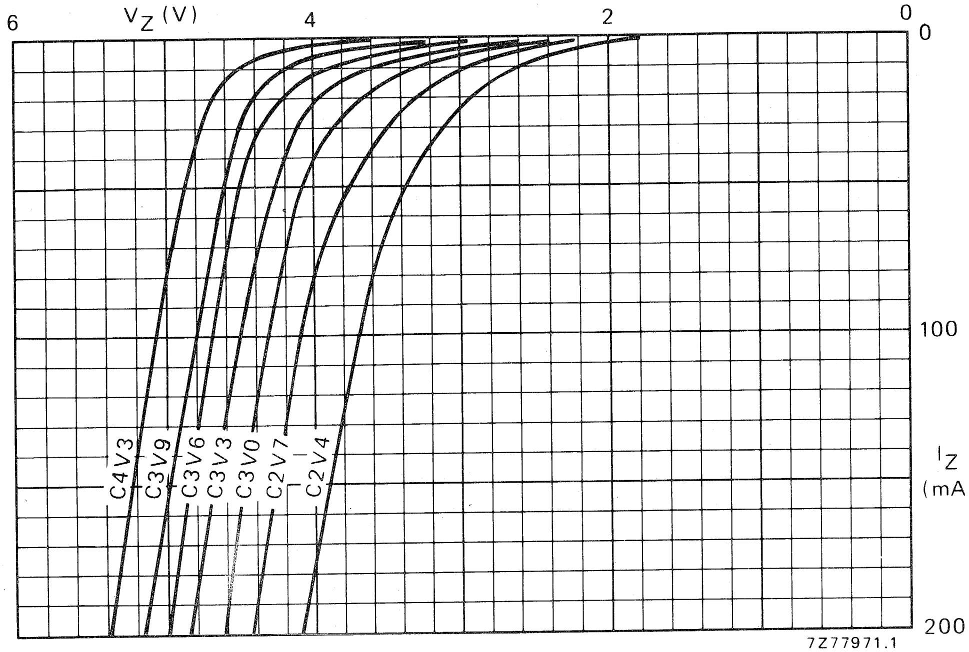


Fig. 2 Dynamic characteristics; typical values; $T_j = 25\ ^{o}C$.

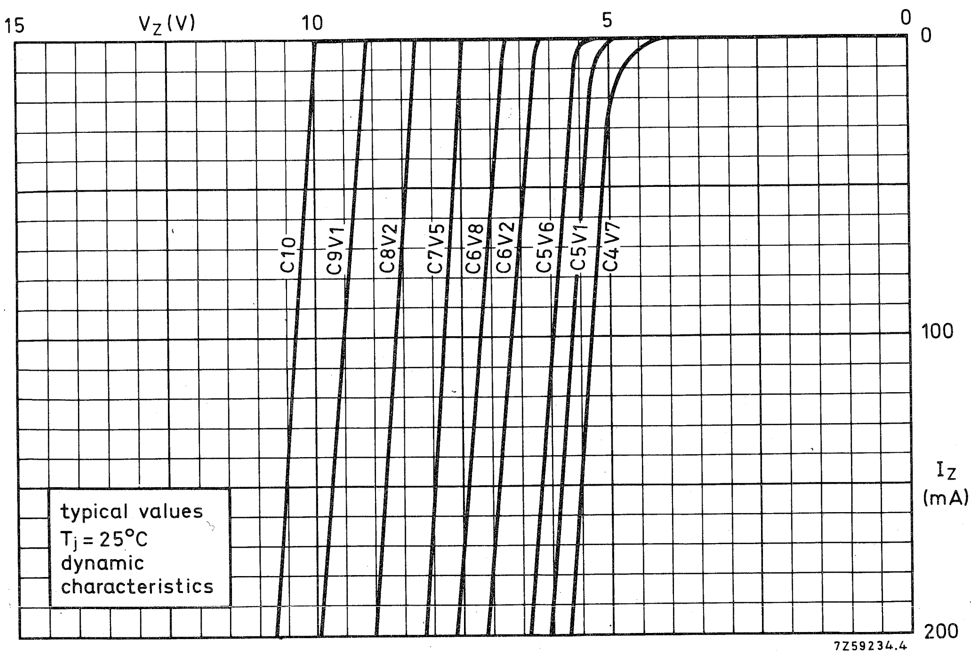


Fig. 3 Dynamic characteristics; typical values at $T_j = 25\ ^{o}C$.

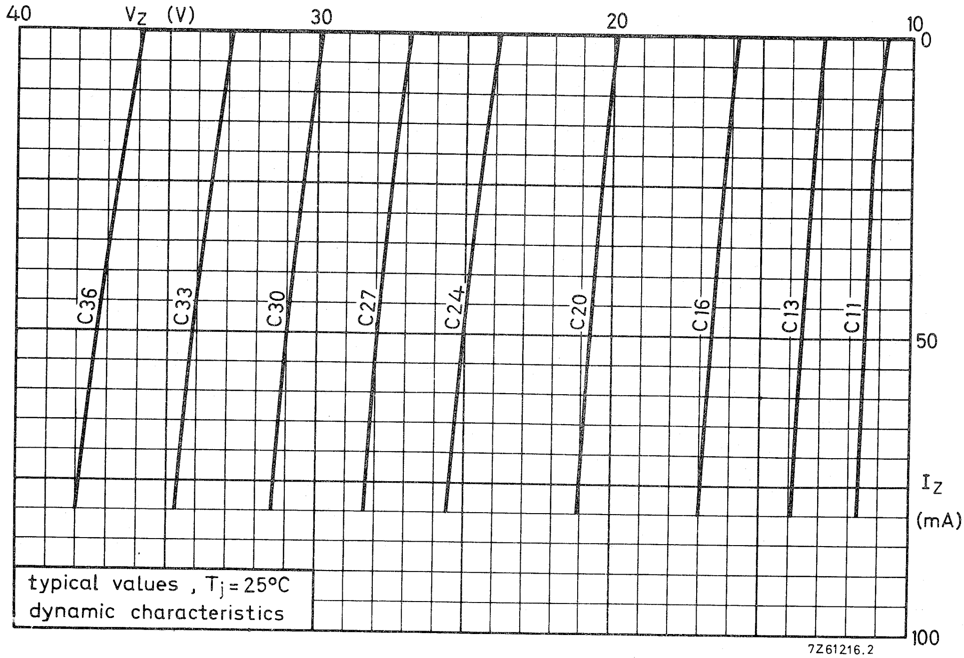


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

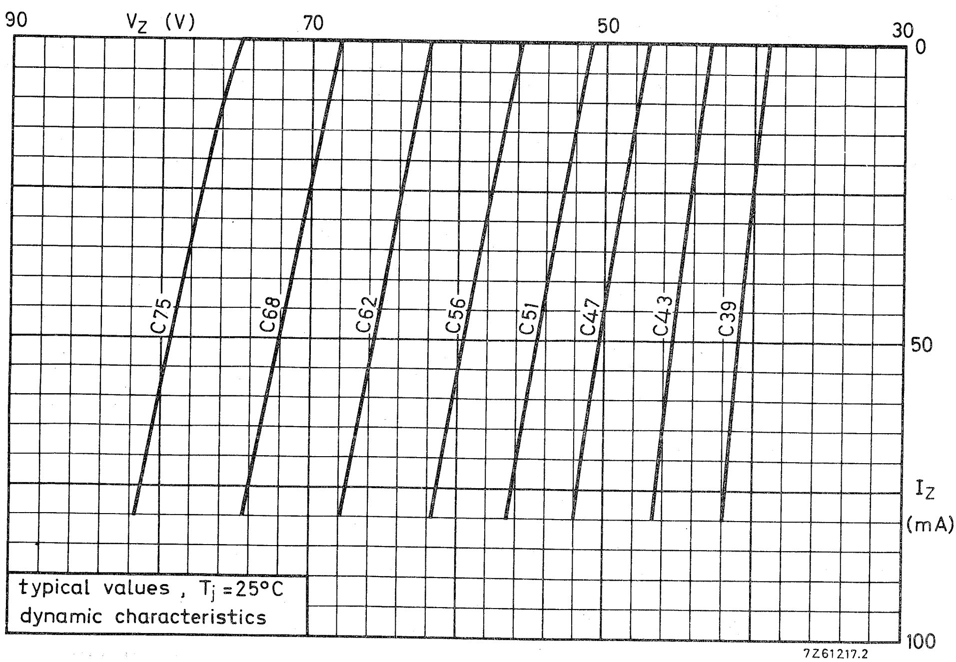


Fig. 5 Dynamic characteristics; typical values at T_j = 25 °C.

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.

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

$$= 24 + 0{,}4 = 24{,}4\ \text{V}.$$

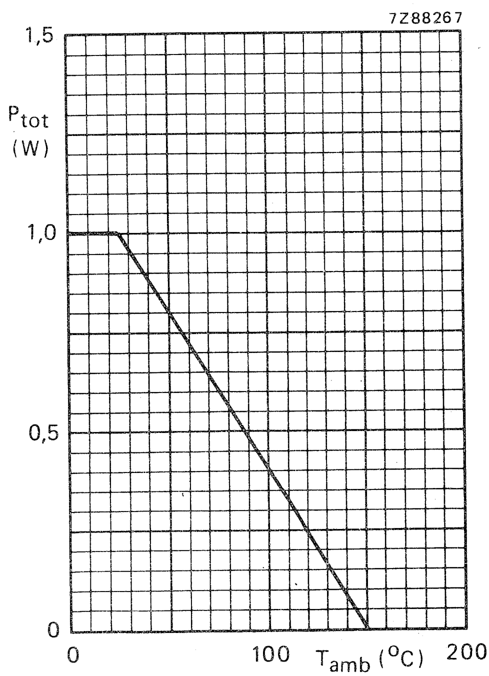


Fig. 6 Power derating curve.

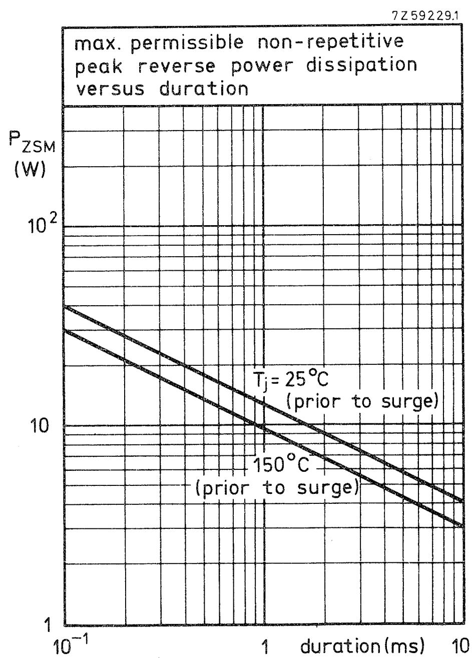


Fig. 7.

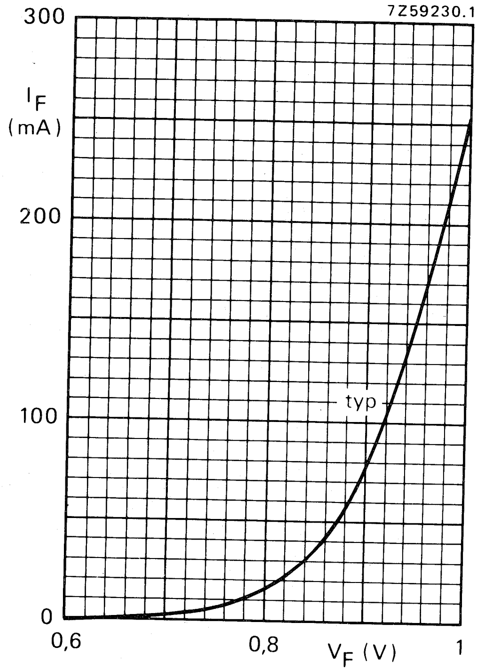


Fig. 8 $T_j = 25\ ^oC$.

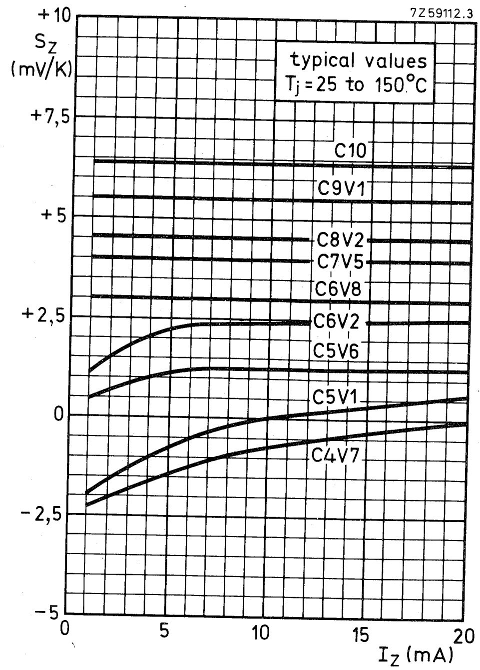


Fig. 9.

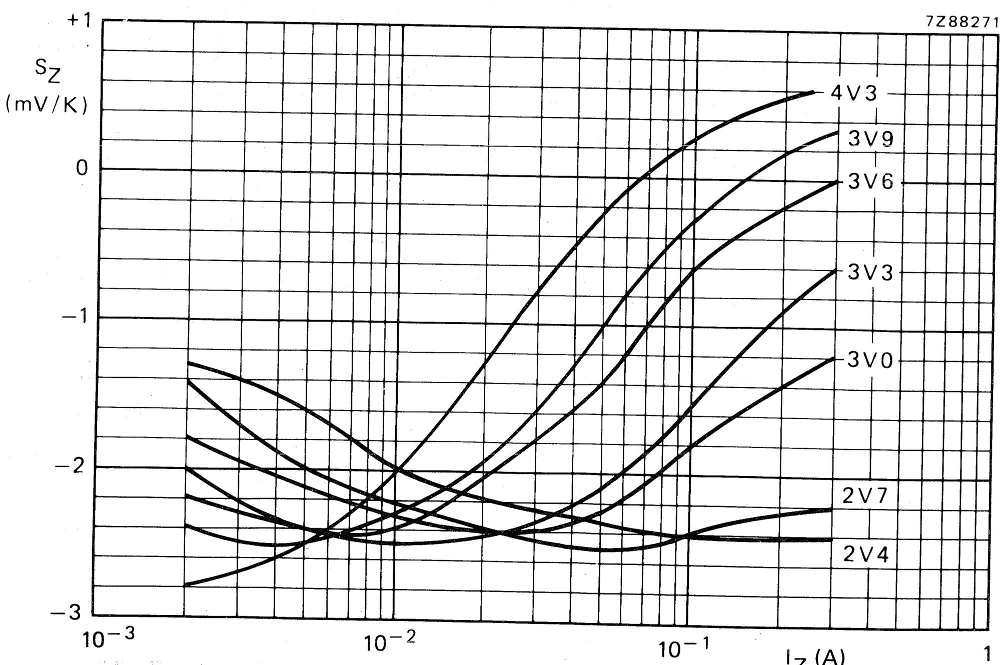


Fig. 10 Typical values temperature coefficient.

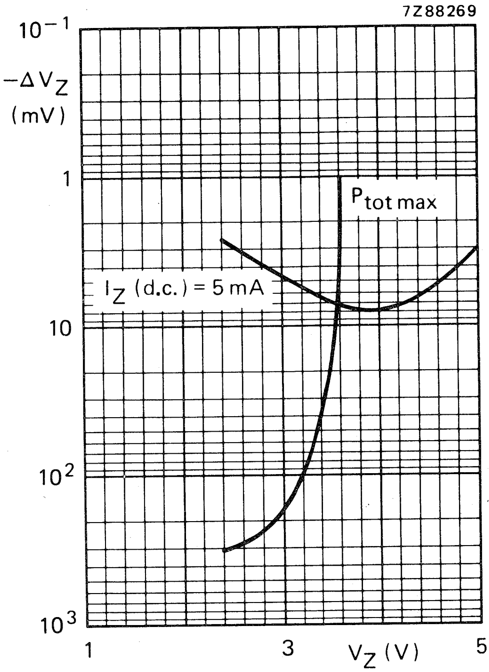


Fig. 11 Typical change of working voltage; $T_j = 25\ ^oC$.

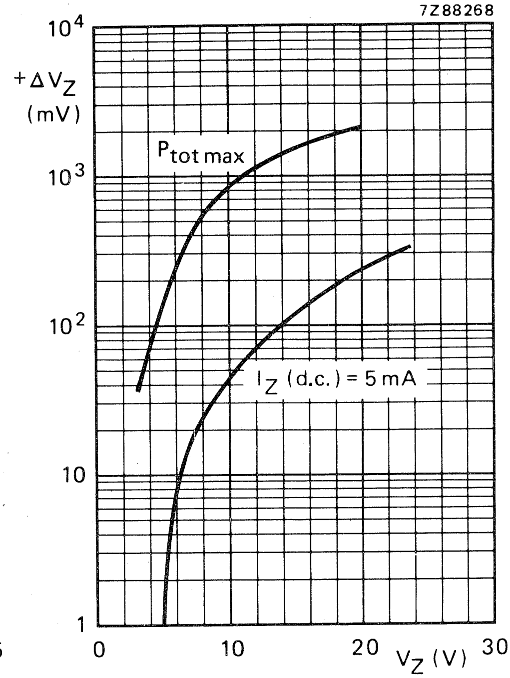


Fig. 12 Typical change of working voltage; $T_{amb} = 25\ ^oC$.

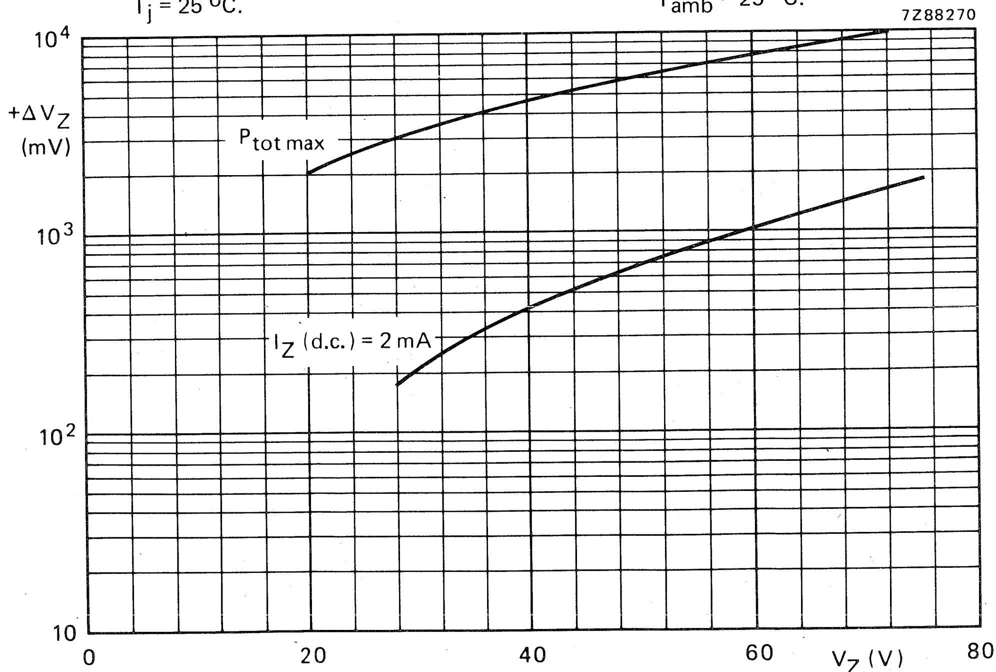


Fig. 13 Typical change of working voltage.

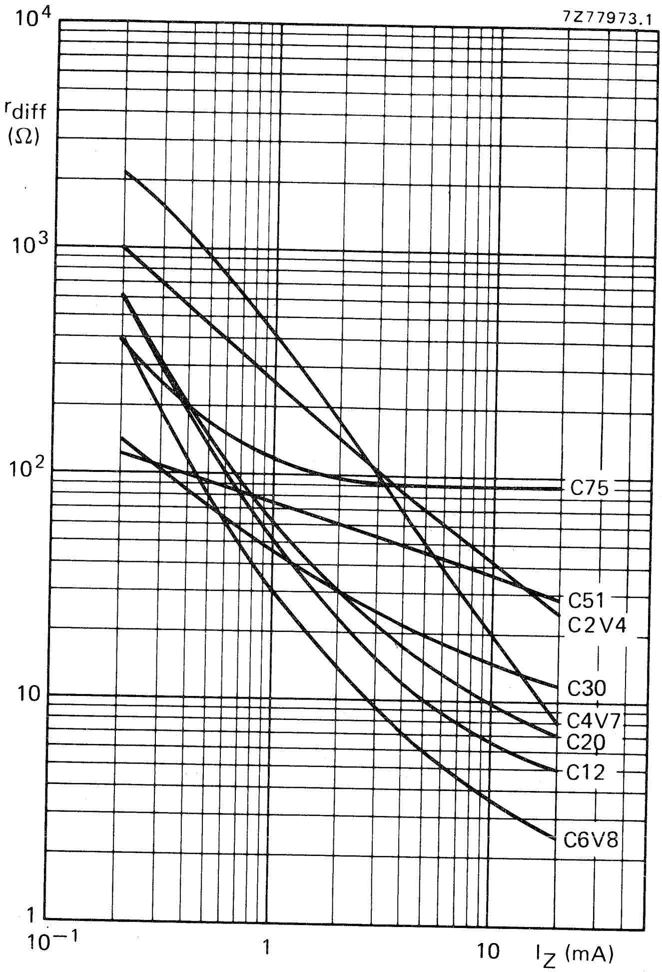


Fig. 14 Typical values; T_j = 25 °C; f = 1 kHz.

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, and also in tolerance ranges of 2% and 3%. 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 a hermetically sealed glass SOD80C 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.

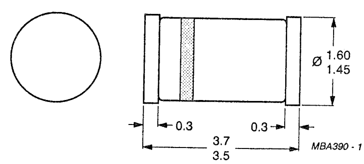
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	2,4 to 75	V
Total power dissipation up to flange temperature of 50 °C	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

MECHANICAL DATA

Dimensions in mm

Fig.1 SOD80C.



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
. = B for ± 2%
. = F for ± 3%.

T_j = 25 °C
± 2% tolerance range

BZV55B	working voltage V_Z (V) at I_{Ztest} = 5 mA min.	max.	differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA typ.	max.	temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA min.	typ.	max.	differential resistance r_{diff} (Ω) at I_Z = 1 mA typ.	max.
B2V4	2,35	2,45	70	100	−3,5	−1,6	0	275	600
B2V7	2,65	2,75	75	100	−3,5	−2,0	0	300	600
B3V0	2,94	3,06	80	95	−3,5	−2,1	0	325	600
B3V3	3,23	3,37	85	95	−3,5	−2,4	0	350	600
B3V6	3,53	3,67	85	90	−3,5	−2,4	0	375	600
B3V9	3,82	3,98	85	90	−3,5	−2,5	0	400	600
B4V3	4,21	4,39	80	90	−3,5	−2,5	0	410	600
B4V7	4,61	4,79	50	80	−3,5	−1,4	0,2	425	500
B5V1	5,00	5,20	40	60	−2,7	−0,8	1,2	400	480
B5V6	5,49	5,71	15	40	−2,0	1,2	2,5	80	400
B6V2	6,08	6,32	6	10	0,4	2,3	3,7	40	150
B6V8	6,66	6,94	6	15	1,2	3,0	4,5	30	80
B7V5	7,35	7,65	6	15	2,5	4,0	5,3	30	80
B8V2	8,04	8,36	6	15	3,2	4,6	6,2	40	80
B9V1	8,92	9,28	6	15	3,8	5,5	7,0	40	100
B10	9,80	10,20	8	20	4,5	6,4	8,0	50	150
B11	10,80	11,20	10	20	5,4	7,4	9,0	50	150
B12	11,80	12,20	10	25	6,0	8,4	10,0	50	150
B13	12,70	13,30	10	30	7,0	9,4	11,0	50	170
B15	14,70	15,30	10	30	9,2	11,4	13,0	50	200
B16	15,70	16,30	10	40	10,4	12,4	14,0	50	200
B18	17,60	18,40	10	45	12,4	14,4	16,0	50	225
B20	19,60	20,40	15	55	14,4	16,4	18,0	60	225
B22	21,60	22,40	20	55	16,4	18,4	20,0	60	250
B24	23,50	24,50	25	70	18,4	20,4	22,0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0,5 mA	
B27	26,50	27,50	25	80	21,4	23,4	25,3	65	300
B30	29,40	30,60	30	80	24,4	26,6	29,4	70	300
B33	32,30	33,70	35	80	27,4	29,7	33,4	75	325
B36	35,30	36,70	35	90	30,4	33,0	37,4	80	350
B39	38,20	39,80	40	130	33,4	36,4	41,2	80	350
B43	42,10	43,90	45	150	37,6	41,2	46,6	85	375
B47	46,10	47,90	50	170	42,0	46,1	51,8	85	375
B51	50,00	51,00	60	180	46,6	51,0	57,2	90	400
B56	54,90	57,10	70	200	52,2	57,0	63,8	100	425
B62	60,80	63,20	80	215	58,8	64,4	71,6	120	450
B68	66,60	69,40	90	240	65,6	71,7	79,8	150	475
B75	73,50	76,50	95	255	73,4	80,2	88,6	170	500

T_j = 25 °C
± 3% tolerance range

BZV55F	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	leakage current I_R at V_R	
	min.	max.	typ.	max.	typ.	μA	V
F2V4	2,33	2,47	70	100	−1,6	50	1
F2V7	2,62	2,78	75	100	−2,0	20	1
F3V0	2,91	3,09	80	100	−2,1	10	1
F3V3	3,20	3,40	85	100	−2,4	5	1
F3V6	3,49	3,71	85	100	−2,4	5	1
F3V9	3,78	4,02	85	100	−2,5	3	1
F4V3	4,17	4,43	80	100	−2,5	3	1
F4V7	4,56	4,84	50	100	−1,4	3	2
F5V1	4,95	5,25	40	80	−0,8	2	2
F5V6	5,43	5,77	15	40	1,2	1	2
F6V2	6,01	6,39	6	30	2,3	3	4
F6V8	6,60	7,00	6	20	3,0	2	4
F7V5	7,28	7,72	6	20	4,0	1	5
F8V2	7,95	8,45	6	20	4,6	0,7	5
F9V1	8,83	9,37	6	20	5,5	0,5	6
F10	9,70	10,30	8	25	6,4	0,2	7
F11	10,67	11,33	10	25	7,4	0,1	8
F12	11,64	12,36	10	25	8,4	0,1	8
F13	12,61	13,39	10	35	9,4	0,1	8
F15	14,55	15,45	10	40	11,4	0,05	10
F16	15,50	16,50	10	45	12,4	0,05	
F18	17,50	18,50	10	50	14,4	0,05	
F20	19,40	20,60	15	60	16,4	0,05	
F22	21,30	22,70	20	70	18,4	0,05	
F24	23,30	24,70	25	80	20,4	0,05	
	at I_{Ztest} = 2 mA		**at I_{Ztest} = 2 mA**		**at I_{Ztest} = 2 mA**	**at I_Z = 0,5 mA**	
F27	26,20	27,80	25	80	23,4	0,05	0,7
F30	29,10	30,90	30	100	26,6	0,05	0,7
F33	32,00	34,00	35	120	29,7	0,05	0,7
F36	34,90	37,10	35	140	33,0	0,05	0,7
F39	37,80	40,20	40	150	36,4	0,05	0,7
F43	41,70	44,30	45	160	41,2	0,05	0,7
F47	45,60	48,40	50	170	46,1	0,05	0,7
F51	49,50	52,50	60	180	51,0	0,05	0,7
F56	54,30	57,70	70	200	57,0	0,05	0,7
F62	60,10	63,90	80	220	64,4	0,05	0,7
F68	66,00	70,00	90	240	71,7	0,05	0,7
F75	72,80	77,20	95	255	80,2	0,05	0,7

T_j = 25 °C
± 5% tolerance range

BZV55C	working voltage V_Z (V) at I_{Ztest} = 5 mA min.	max.	differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA typ.	max.	temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA min.	typ.	max.	differential resistance r_{diff} (Ω) at I_Z = 1 mA typ.	max.
C2V4	2,20	2,60	70	100	−3,5	−1,6	0	275	600
C2V7	2,50	2,90	75	100	−3,5	−2,0	0	300	600
C3V0	2,80	3,20	80	95	−3,5	−2,1	0	325	600
C3V3	3,10	3,50	85	95	−3,5	−2,4	0	350	600
C3V6	3,40	3,80	85	90	−3,5	−2,4	0	375	600
C3V9	3,70	4,10	85	90	−3,5	−2,5	0	400	600
C4V3	4,00	4,60	80	90	−3,5	−2,5	0	410	600
C4V7	4,40	5,00	50	80	−3,5	−1,4	0,2	425	500
C5V1	4,80	5,40	40	60	−2,7	−0,8	1,2	400	480
C5V6	5,20	6,00	15	40	−2,0	2,5	2,5	80	400
C6V2	5,80	6,60	6	10	0,4	2,3	3,7	40	150
C6V8	6,40	7,20	6	15	1,2	3,0	4,5	30	80
C7V5	7,00	7,90	6	15	2,5	4,0	5,3	30	80
C8V2	7,70	8,70	6	15	3,2	4,6	6,2	40	80
C9V1	8,50	9,60	6	15	3,8	5,5	7,0	40	100
C10	9,40	10,60	8	20	4,5	6,4	8,0	50	150
C11	10,40	11,60	10	20	5,4	7,4	9,0	50	150
C12	11,40	12,70	10	25	6,0	8,4	10,0	50	150
C13	12,40	14,10	10	30	7,0	9,4	11,0	50	170
C15	13,80	15,60	10	30	9,2	11,4	13,0	50	200
C16	15,30	17,10	10	40	10,4	12,4	14,0	50	200
C18	16,80	19,10	10	45	12,4	14,4	16,0	50	225
C20	18,80	21,20	15	55	14,4	16,4	18,0	60	225
C22	20,80	23,30	20	55	16,4	18,4	20,0	60	250
C24	22,80	25,60	25	70	18,4	20,4	22,0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0,5 mA	
C27	25,10	28,90	25	80	21,4	23,4	25,3	65	300
C30	28,00	32,00	30	80	24,4	26,6	29,4	70	300
C33	31,00	35,00	35	80	27,4	29,7	33,4	75	325
C36	34,00	38,00	35	90	30,4	33,0	37,4	80	350
C39	37,00	41,00	40	130	33,4	36,4	41,2	80	350
C43	40,00	46,00	45	150	37,6	41,2	46,6	85	375
C47	44,00	50,00	50	170	42,0	46,1	51,8	85	375
C51	48,00	54,00	60	180	46,6	51,0	57,2	90	400
C56	52,00	60,00	70	200	52,2	57,0	63,8	100	425
C62	58,00	66,00	80	215	58,8	64,4	71,6	120	450
C68	64,00	72,00	90	240	65,6	71,7	79,8	150	475
C75	70,00	79,00	95	255	73,4	80,2	88,6	170	500

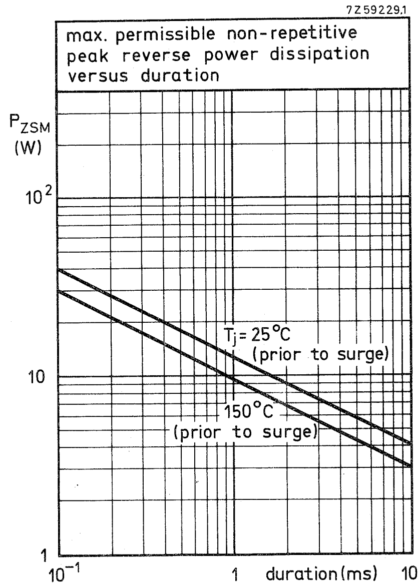

7Z59229.1
max. permissible non-repetitive peak reverse power dissipation versus duration
P_{ZSM} (W)
10^2
10
1
$T_j = 25\,°C$ (prior to surge)
150 °C (prior to surge)
10^{-1}
1
duration (ms)
10

Fig. 2.

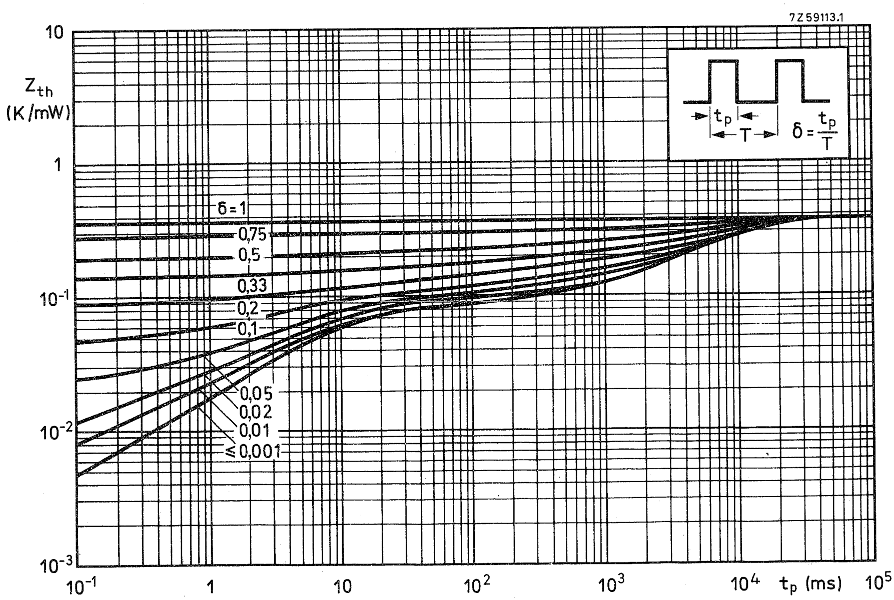

7Z59113.1
Z_{th} (K/mW)
10
1
10^{-1}
10^{-2}
10^{-3}
δ = 1
0,75
0,5
0,33
0,2
0,1
0,05
0,02
0,01
≤ 0,001
t_p
T
$\delta = \frac{t_p}{T}$
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5

Fig. 3.

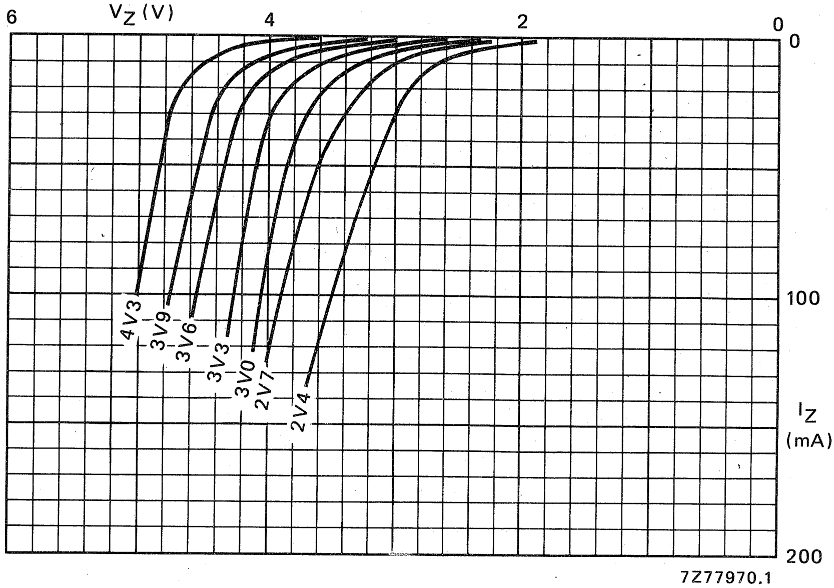


Fig. 4 Static characteristics; typical values; T_{amb} = 25 °C.

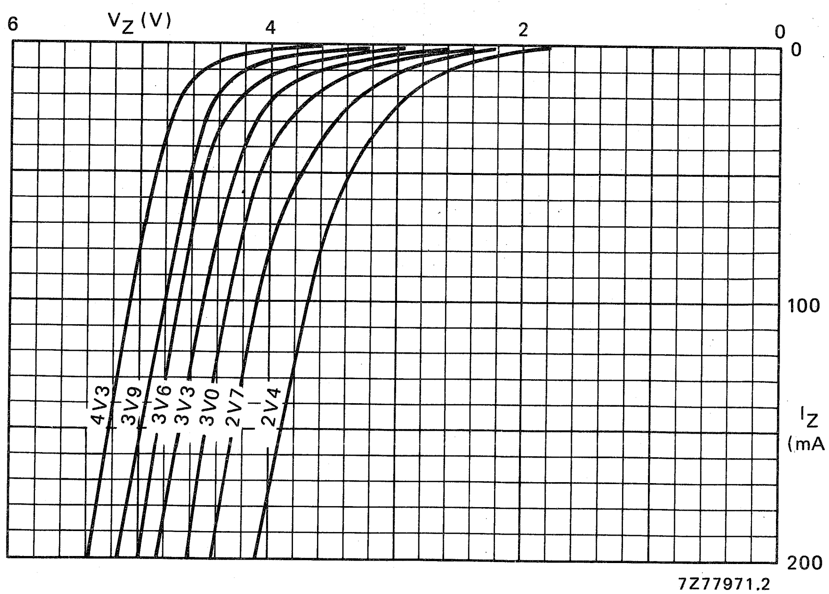


Fig. 5 Dynamic characteristics; typical values; T_j = 25 °C.

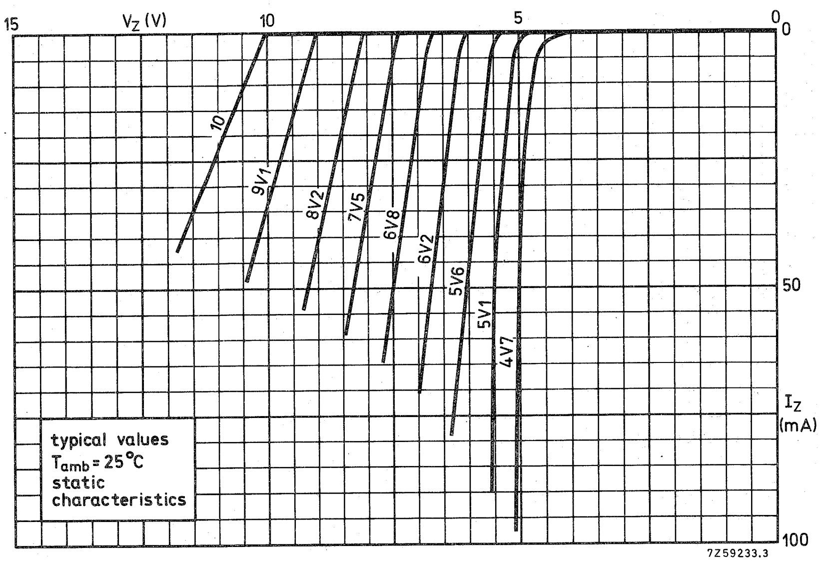

15
V_Z (V)
10
5
0
0
10
9V1
8V2
7V5
6V8
6V2
5V6
5V1
4V7
50
I_Z
(mA)
100
typical values
$T_{amb} = 25°C$
static
characteristics
7Z59233.3

Fig. 6.

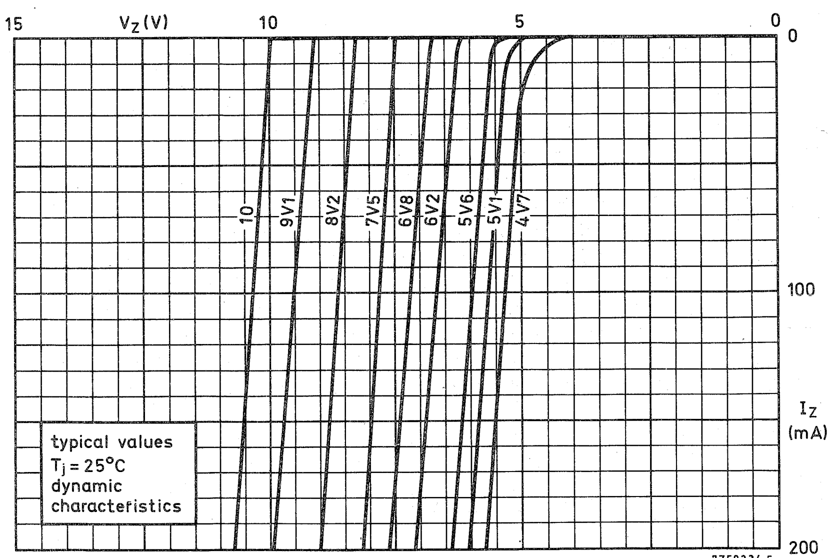

15
V_Z (V)
10
5
0
0
10
9V1
8V2
7V5
6V8
6V2
5V6
5V1
4V7
100
I_Z
(mA)
200
typical values
$T_j = 25°C$
dynamic
characteristics
7Z59234.5

Fig. 7.

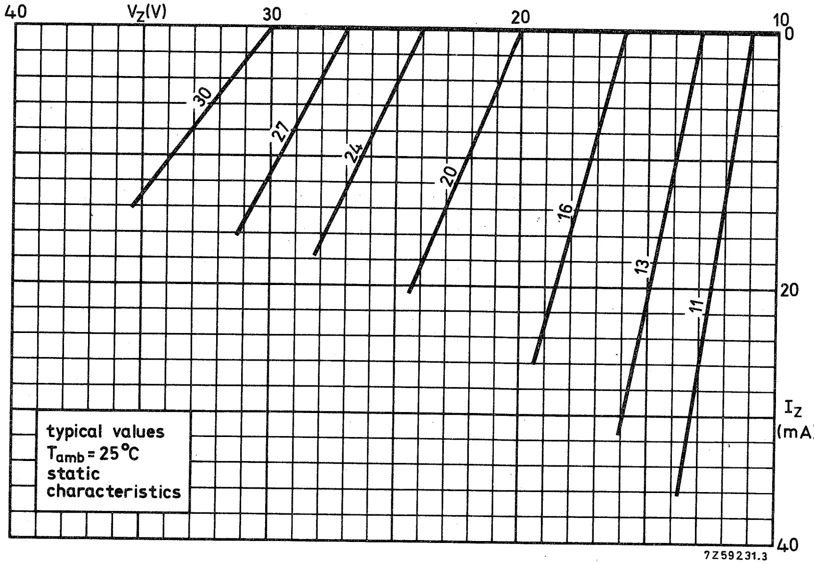

40
V_Z(V)
30
20
10
0
30
27
24
20
16
13
11
20
I_Z
(mA)
40
typical values
T_{amb} = 25 °C
static
characteristics
7Z59231.3

Fig. 8.

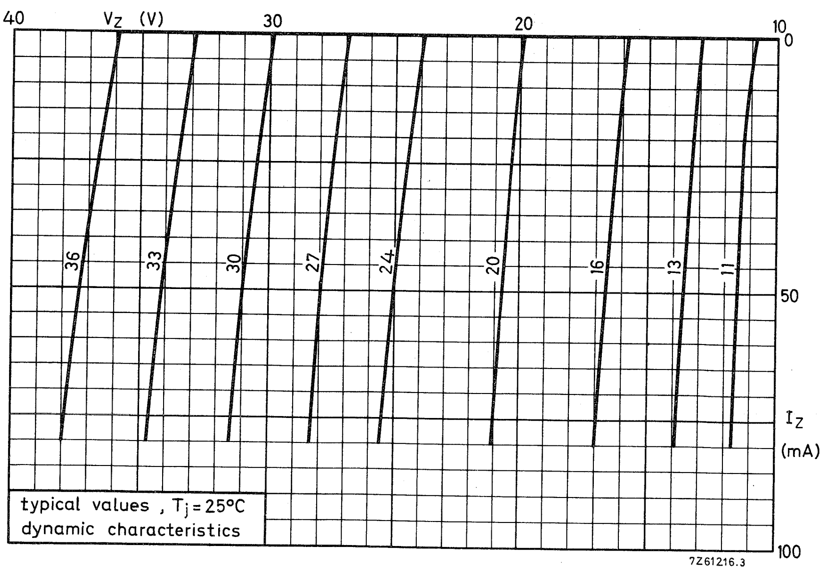

40
V_Z (V)
30
20
10
0
36
33
30
27
24
20
16
13
11
50
I_Z
(mA)
100
typical values , T_j = 25°C
dynamic characteristics
7Z61216.3

Fig. 9.

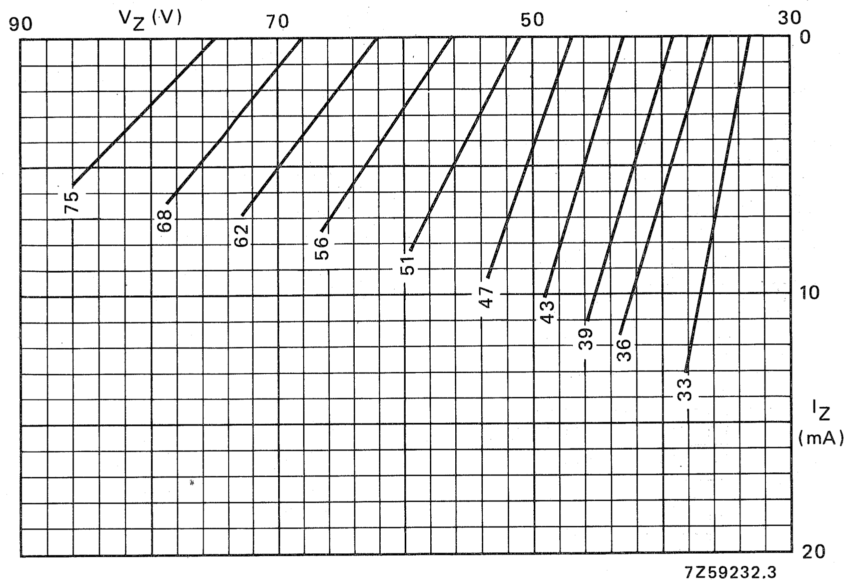


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

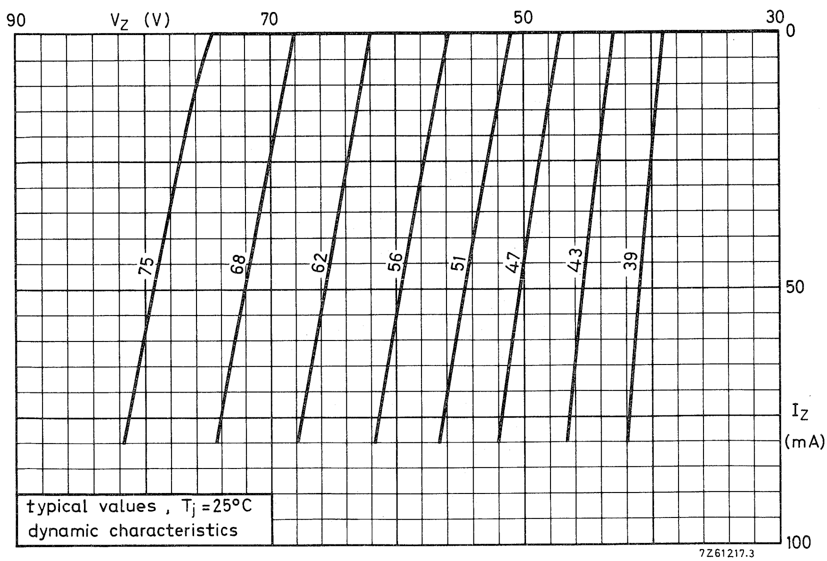


Fig. 11.

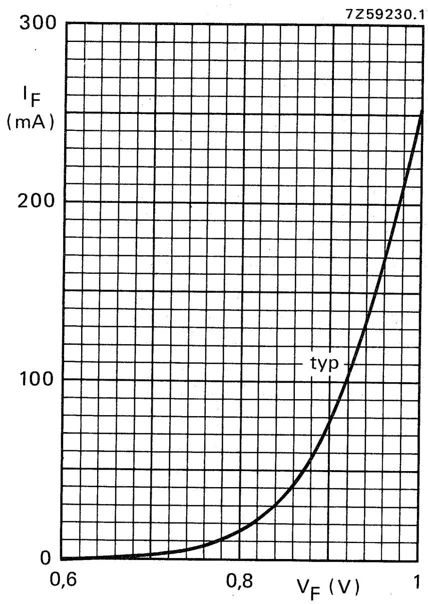


Fig. 12 T_j = 25 °C.

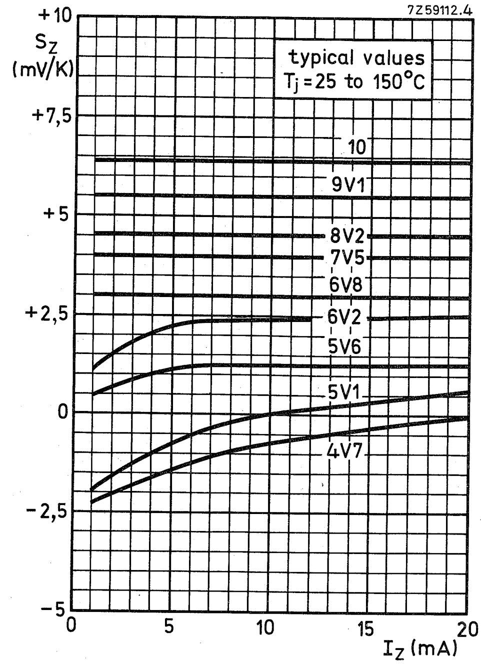


Fig. 13.

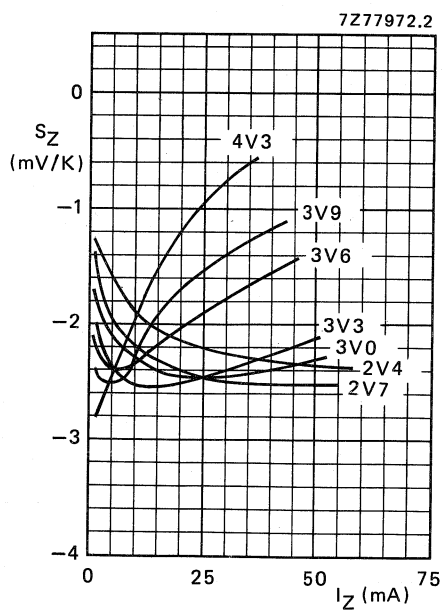


Fig. 14 Typical values; T_j = 25 to 150 °C.

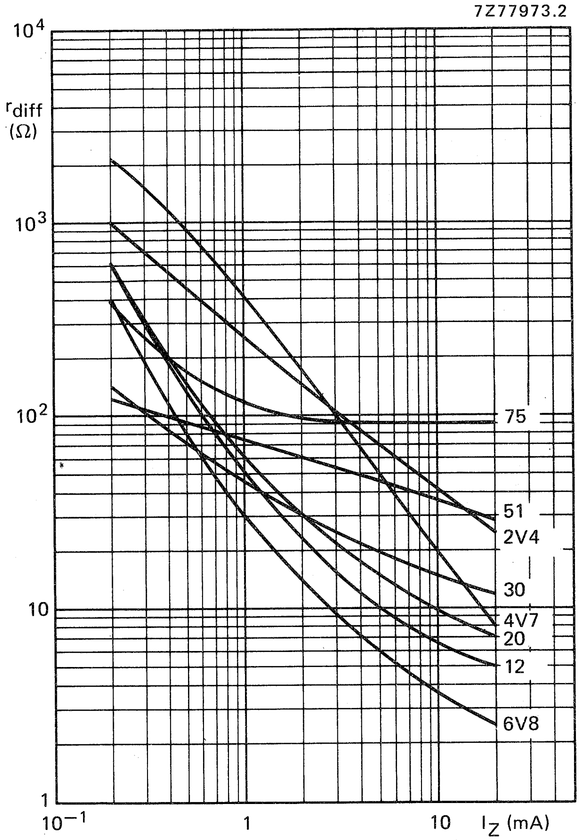


Fig. 15 Typical values; T_j = 25 °C; f = 1 kHz.

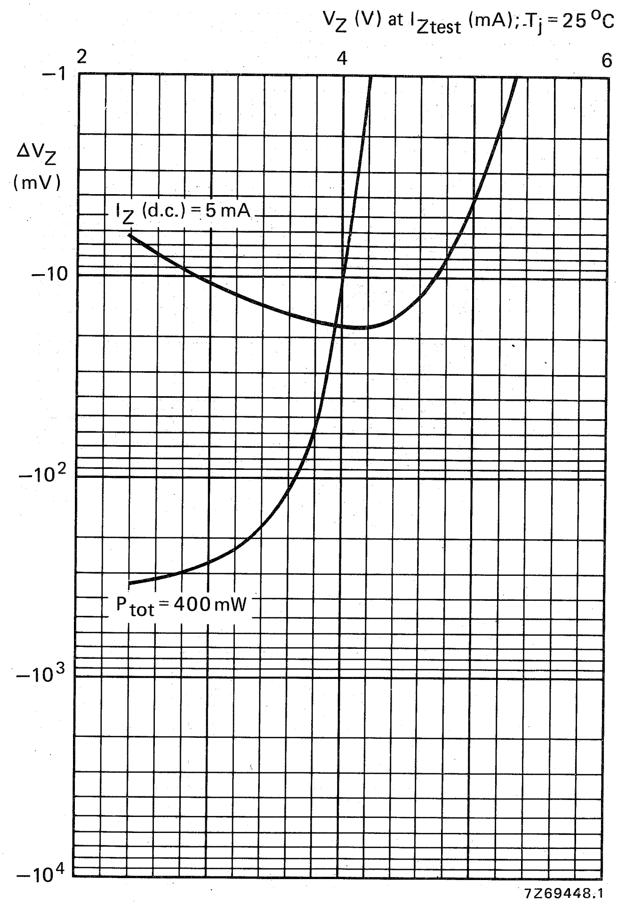


Fig. 16 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

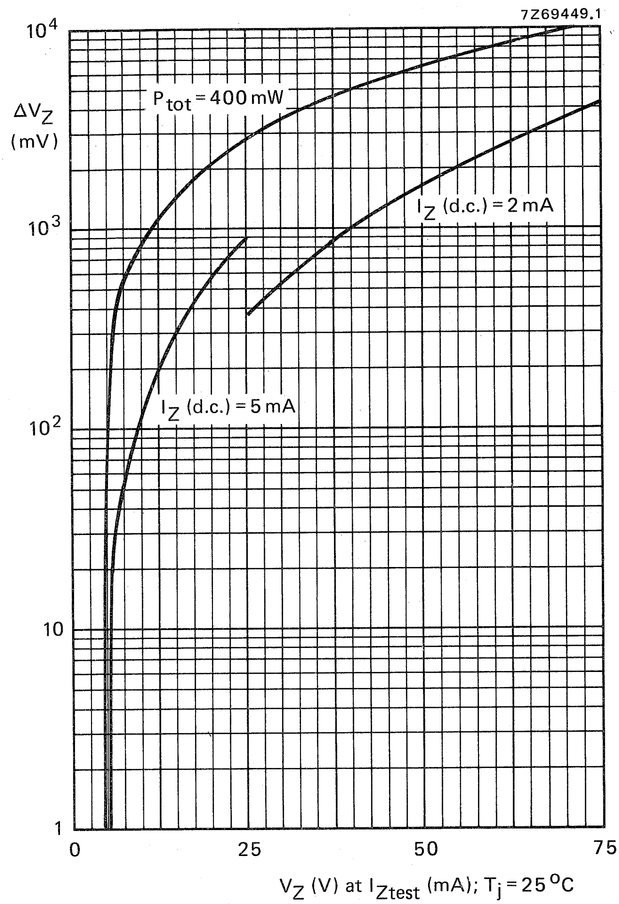


Fig. 17 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

VOLTAGE REFERENCE DIODES FOR SURFACE MOUNTING

Voltage reference diodes in a SOD-80 envelope. They have a low temperature coefficient and are primarily intended for use as voltage reference sources.

The SM diode is a leadless diode in a 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.

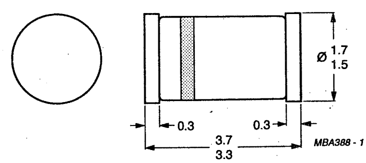
QUICK REFERENCE DATA

Reference voltage at I_Z = 7,5 mA		V_{ref}	>	5,89	V
			typ.	6,20	V
			<	6,51	V
Temperature coefficient at I_Z = 7,5 mA	BZV80	$\lvert S_Z \rvert$	<	0,01	%/K
	BZV81	$\lvert S_Z \rvert$	<	0,005	%/K
Operating temperature		T_{amb}		−20 to + 80	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD-80



The cathode is indicated by a yellow 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}		−20 to + 80 °C

THERMAL RESISTANCE

From junction to ambient mounted on a ceramic substrate of 10 x 10 x 0,6 mm	$R_{th\ j\text{-}a}$	=	380 K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise specified

Reference voltage at I_Z = 7,5 mA		V_{ref}	>	5,89 V
			typ.	6,20 V
			<	6,51 V
Reference voltage excursion at I_Z = 7,5 mA ambient temperature test points −20; + 25; + 55; + 80 °C	BZV80	$\|\Delta V_{ref}\|$	<	62 mV
	BZV81	$\|\Delta V_{ref}\|$	<	31 mV
Effective temperature coefficient at I_Z = 7,5 mA	BZV80	$\|S_Z\|$	<	0,01 %/K
	BZV81	$\|S_Z\|$	<	0,005 %/K
Differential resistance at I_Z = 7,5 mA		r_{diff}	<	15 Ω

Notes

1. 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 with I_Z, namely the differential resistance r_{diff} and the temperature coefficient S_Z.
   a. Each change of I_Z can result in a maximum change of V_{ref} as follows:
   $$\Delta V_{ref}\ (\text{mV}) = \Delta I_Z\ (\text{mA}) \times 15\ \Omega$$
   taking into account r_{diff} is max. 15 Ω.
   b. The temperature coefficient of the reference voltage is also a function of I_Z. However, for these reference diodes S_Z varies max. ± 0,05 mV/K or ± 0,001 %/K when I_Z is between 6 and 10 mA, so this effect can be neglected in practice for these types.

2. The temperature coefficient of the reference voltage is obtained from the following equation.
   $$S_Z = \frac{(V_{ref\ 1} - V_{ref\ 2})}{(T_{amb\ 2} - T_{mab\ 1})} \times \frac{100}{V_{ref\ nom}}\ \%/\text{K}$$

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

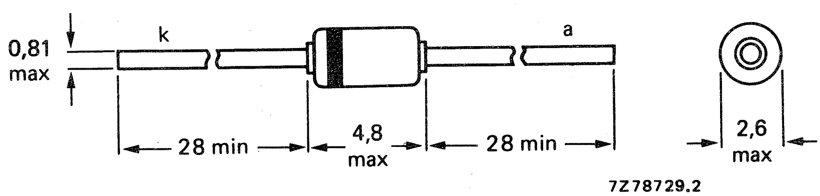
Working voltage range	V_Z	nom.	3,6 to 75	V
Total power dissipation	P_{tot}	max.	1,3	W*
Non-repetitive peak reverse power dissipation t_p = 100 μs; T_j = 25 °C	P_{ZSM}	max.	60	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to tie-point	$R_{th\ j\text{-}tp}$	=	110	K/W*

* 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.
The diodes are type-branded.

Products approved to CECC 50 005-010.

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. max.	1,30 1	W* 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} min.	nom.	max.	test current I_{Ztest} (mA)	differential resistance r_{diff} (Ω) at I_{Ztest} max.	temperature coefficient S_Z(mV/K) at I_{Ztest} min.	max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)
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
C56	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

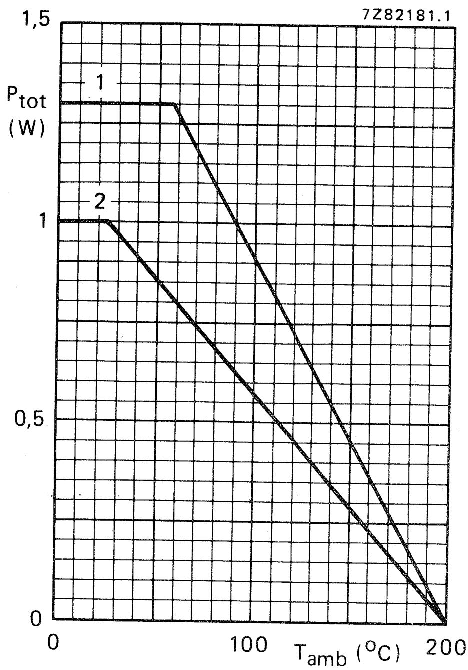


Fig. 2 Maximum permissible power dissipation versus ambient temperature.

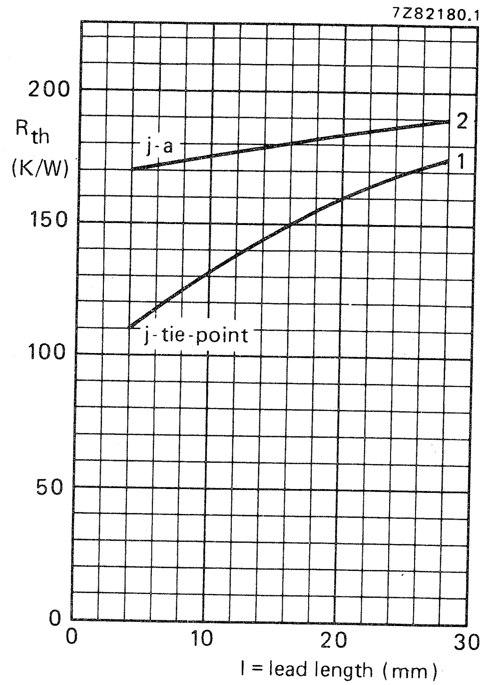
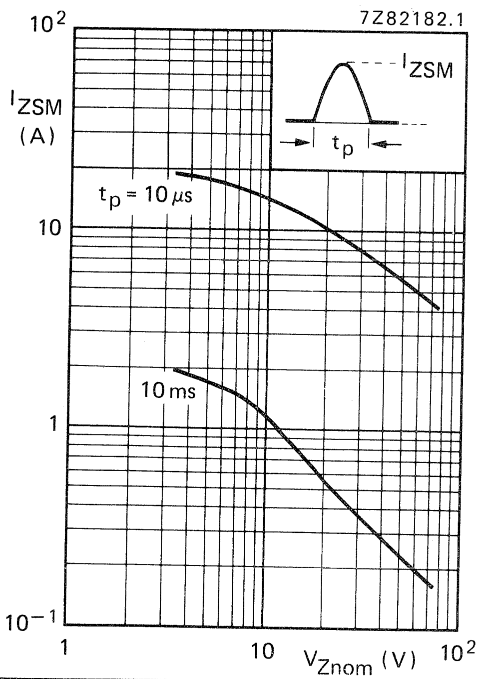


Fig. 3 Thermal resistance versus lead length.



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.

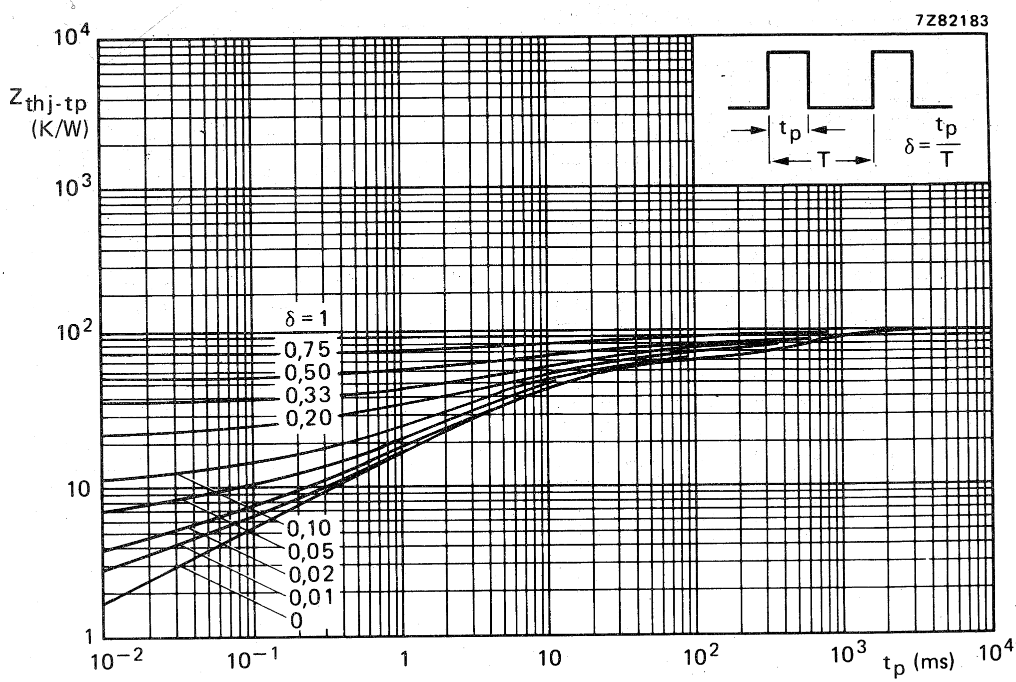


Fig. 5 Thermal impedance from junction to tie-point with a lead length of 4 mm.

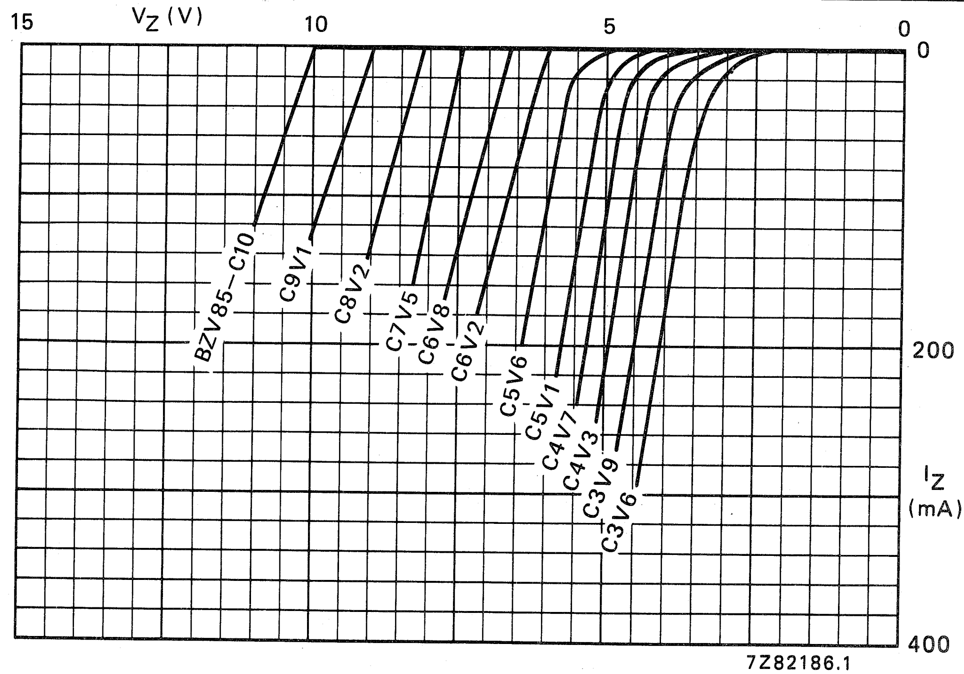


Fig. 6 Static characteristics; typical values; T_{amb} = 25 °C.

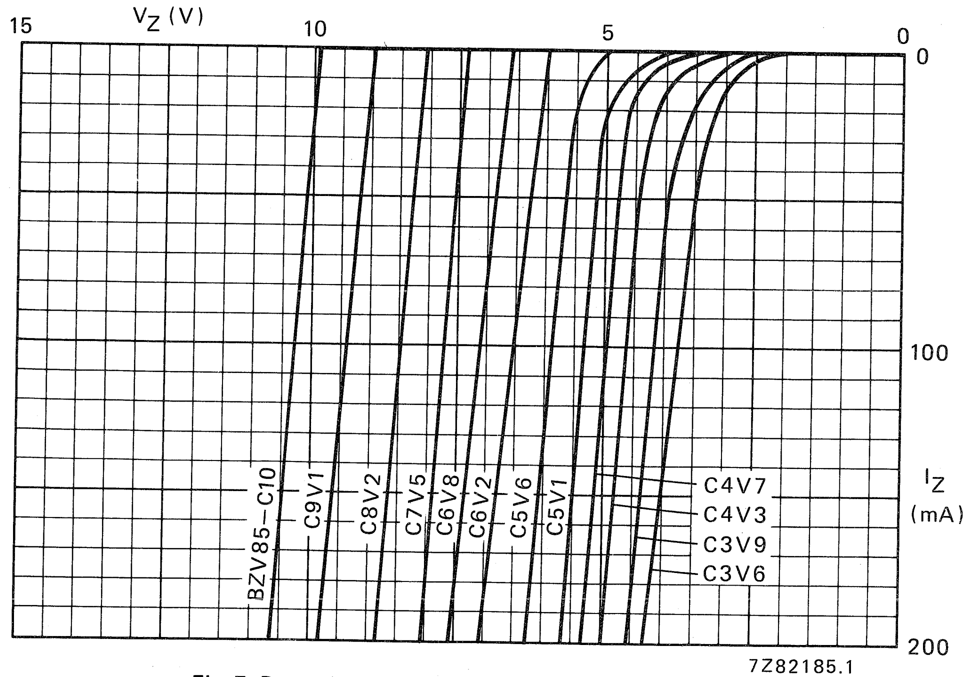


Fig. 7 Dynamic characteristics; typical values; T_j = 25 °C.

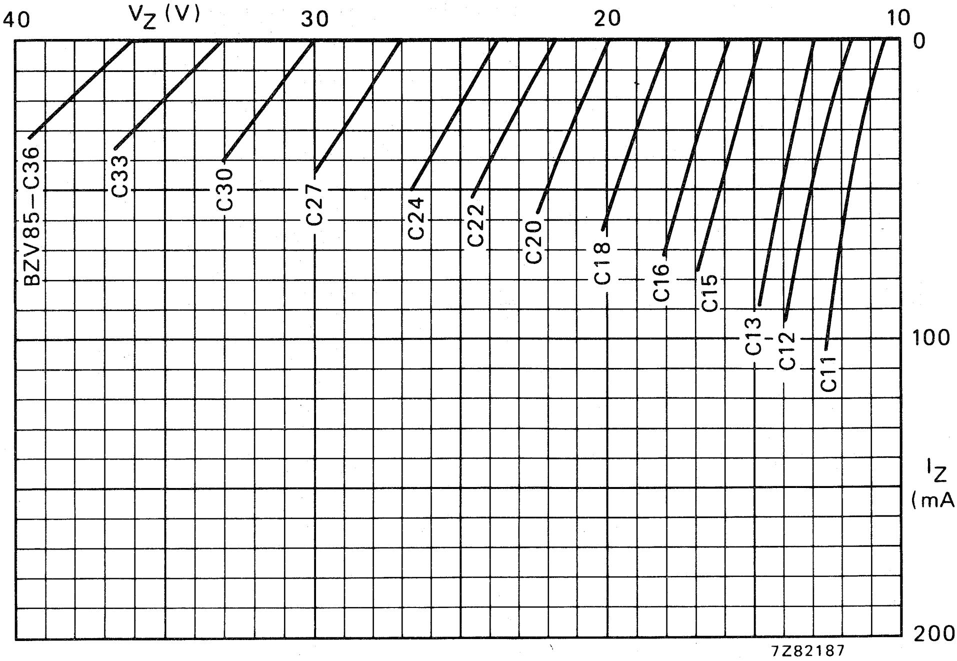


Fig. 8 Static characteristics; typical values; T_{amb} = 25 °C.

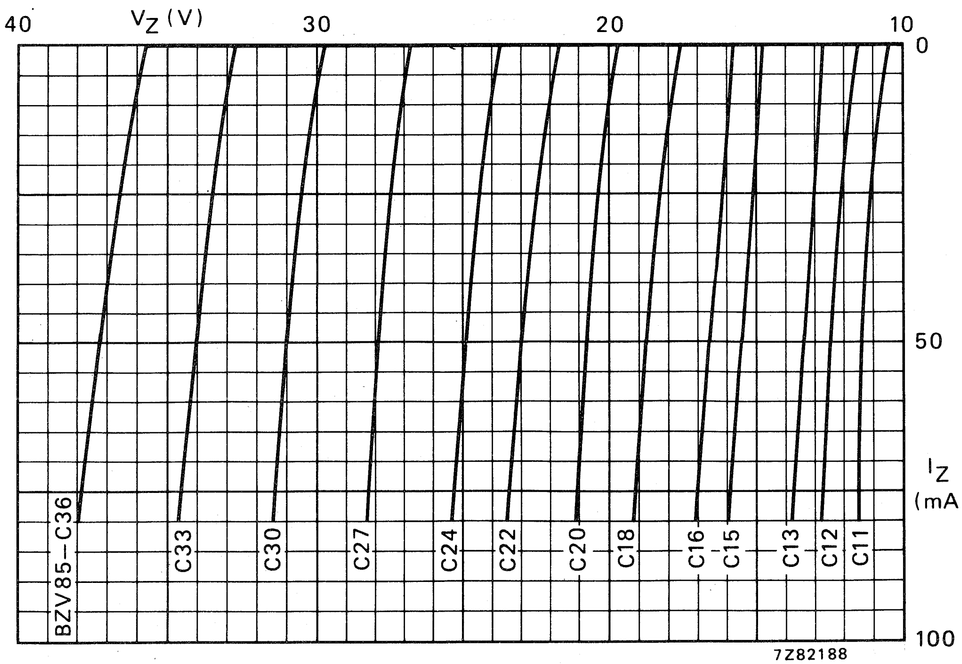


Fig. 9 Dynamic characteristics; typical values; T_j = 25 °C.

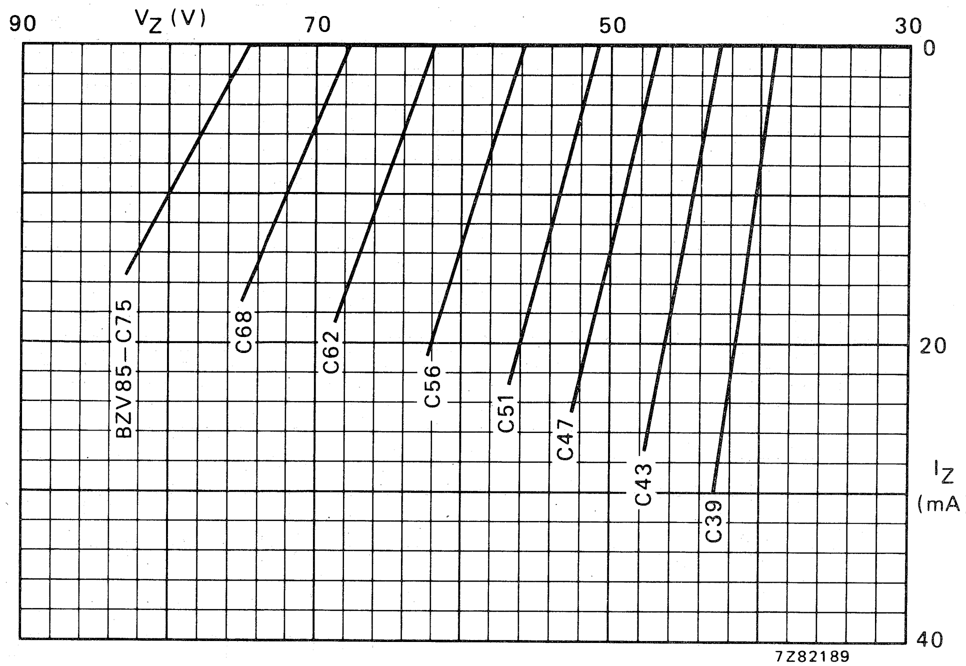


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

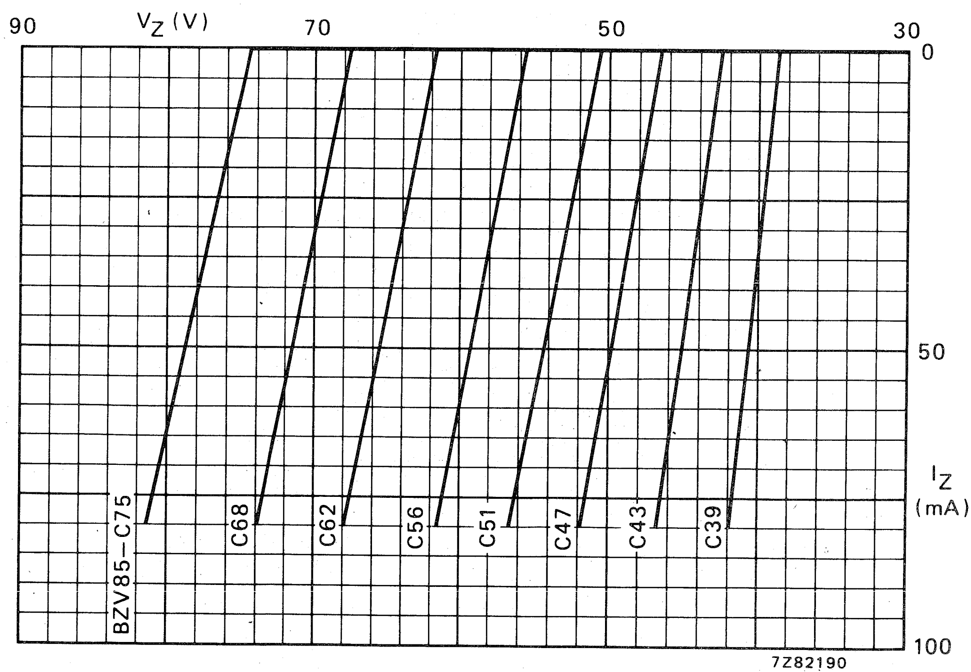


Fig. 11 Dynamic characteristics; typical values; T_j = 25 °C.

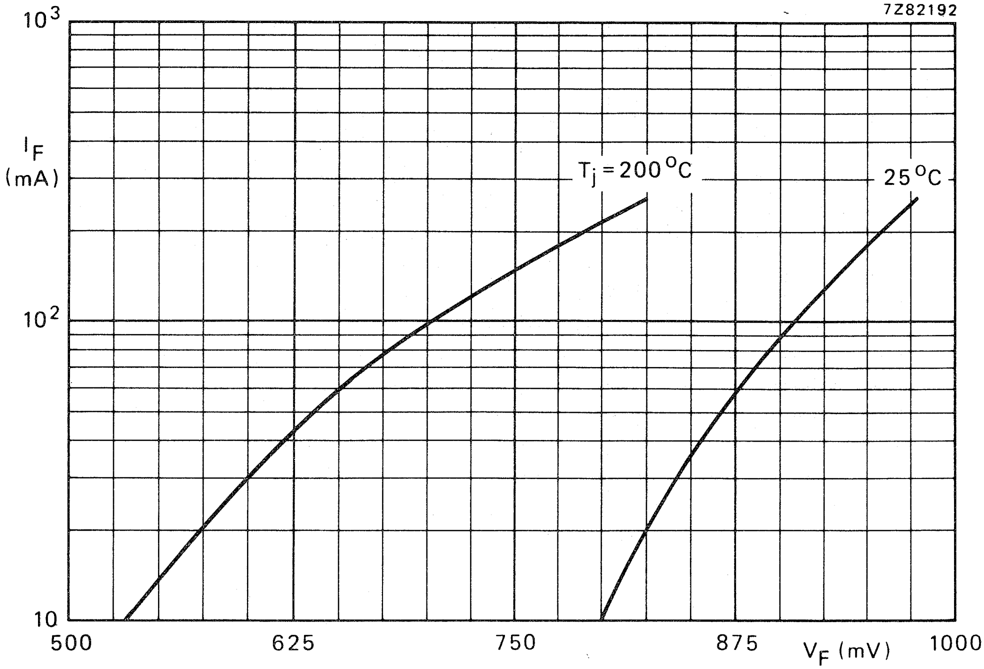


Fig. 12 Typical values.

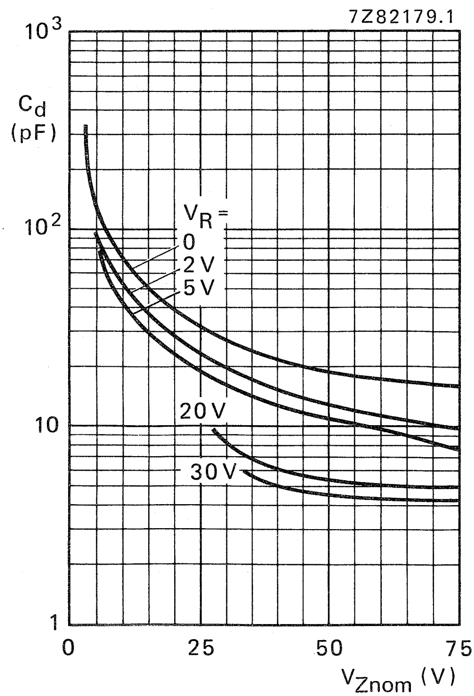


Fig. 13 f = 1 MHz; T_j = 25 ^oC; typical values.

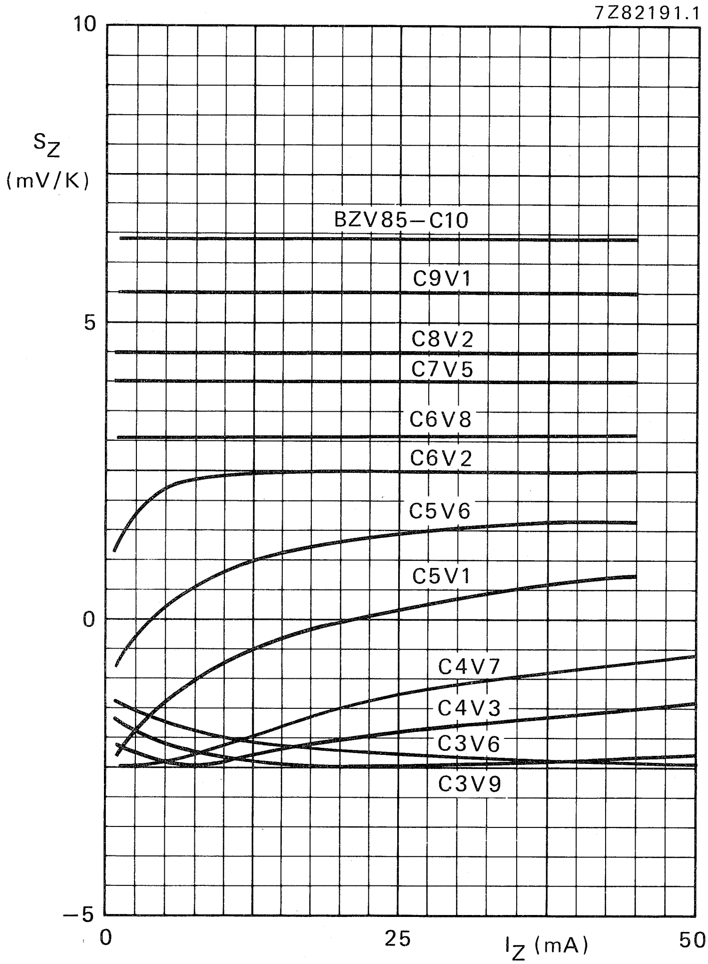


Fig. 14 T_j = 25 °C to 150 °C; typical values.

For types above 7,5 V the temperature coefficient is independent of current and can be read from the CHARACTERISTICS.

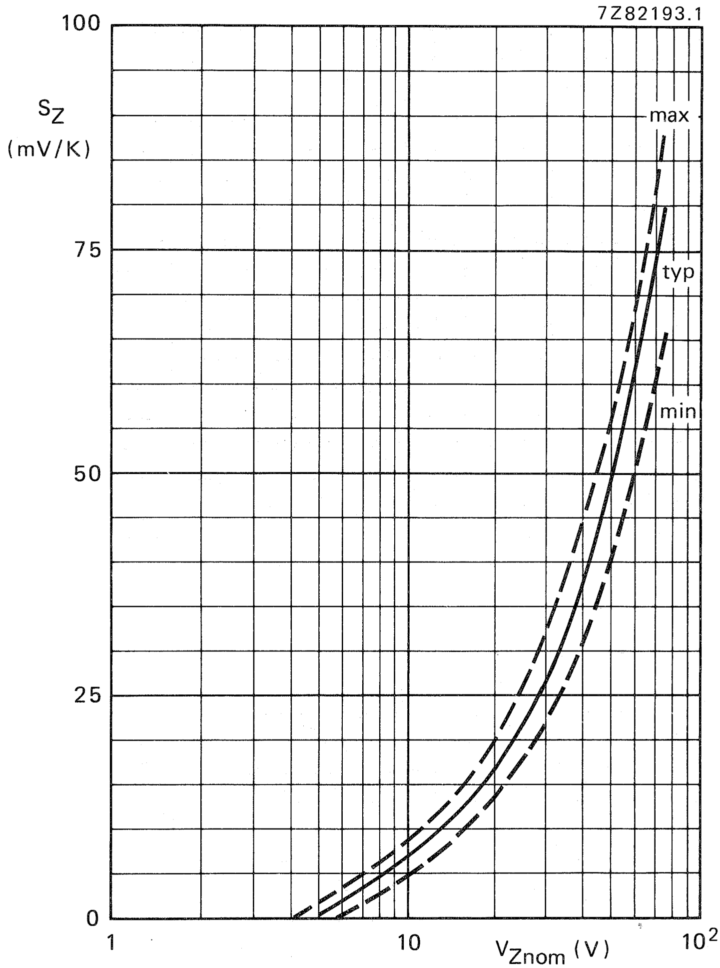


Fig. 15 $I_Z = I_{Ztest}$; T_j = 25 °C to 150 °C.

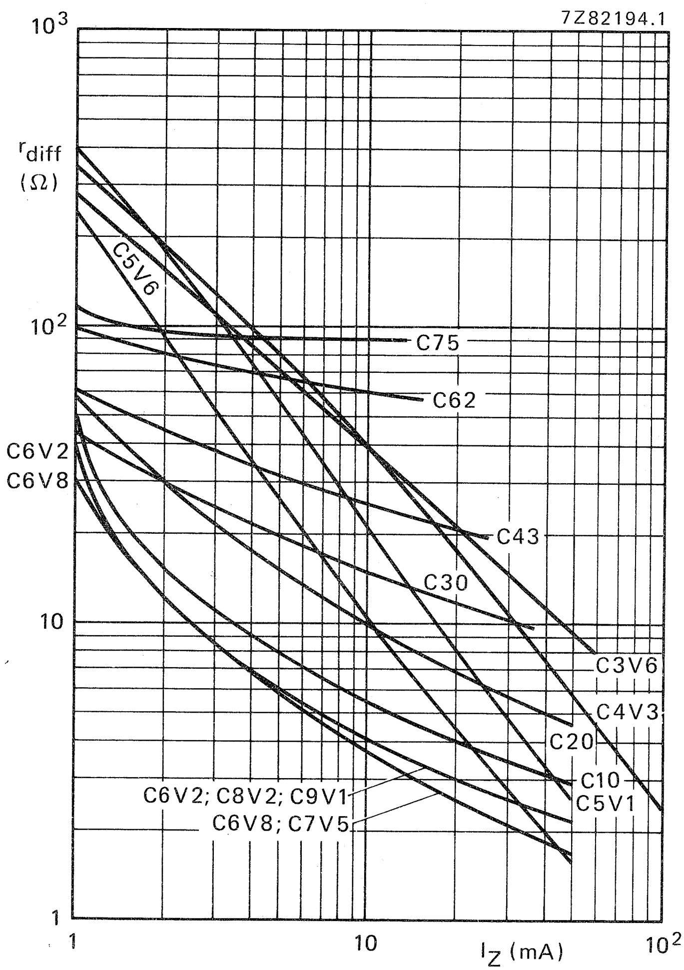


Fig. 16 f = 1 kHz; T_j = 25 °C; typical values.

LOW VOLTAGE STABISTORS

Silicon planar integrated voltage regulator diodes in hermetically sealed SOD-27 glass envelopes, intended for low power clipping, level shifting, voltage regulation, temperature stabilization of transistor base-emitter biasing network and in many other applications where tight tolerances and low voltage levels are required.
The series consists of four types with nominal voltage ranging from 1,4 V to 3,2 V.

QUICK REFERENCE DATA

Regulation voltage range	V_F	nom.	1V4	2V0	2V6	3V2	V
Continuous reverse voltage	V_R	max.			10		V
Repetitive peak reverse voltage	V_{RRM}	max.			10		V
Total power dissipation up to T_a = 25 °C	P_{tot}	max.			330		mW
Junction temperature	T_j	max.			150		°C
Differential resistance at I_F = 5 mA; f = 1 kHz	r_{diff}	typ.	10	15	18	20	Ω
		max.	20	30	32,5	35	Ω

MECHANICAL DATA

Dimensions in mm

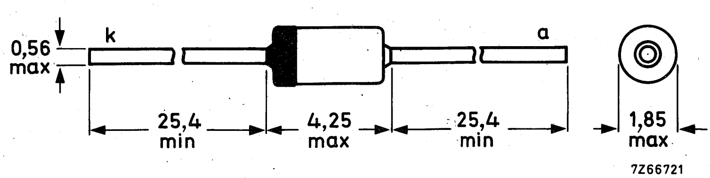


Fig.1 DO-35 (SOD-27).

The marking band indicates the cathode.
The diodes are type branded.

RATINGS

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

			1V4	2V0	2V6	3V2	
Repetitive peak forward current	I_{FRM}	max.	250		150		mA
Continuous reverse voltage	V_R	max.	10				V
Repetitive peak reverse voltage	V_{RRM}	max.	10				V
Total power dissipation up to T_a = 25 °C	P_{tot}	max.	330				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	$R_{th\ j\text{-}a}$	=	380	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			1V4	2V0	2V6	3V2	
Regulation voltage range at I_F = 5 mA	V_F	min.	1,3	1,85	2,35	2,85	V
		max.	1,5	2,15	2,8	3,45	V
Differential resistance at I_F = 1 mA; f = 1 kHz	r_{diff}	typ.	55	80	90	100	Ω
at I_F = 5 mA; f = 1 kHz	r_{diff}	typ.	10	15	18	20	Ω
		max.	20	30	32,5	35	Ω
at I_F = 10 mA; f = 1 kHz	r_{diff}	typ.	6,0	8,0	9,0	10	Ω
		max.	10	15	17,5	20	Ω
Negative temperature coefficient at I_F = 5 mA	S_F	typ.	3,8	6,0	8,5	11,5	mV/K
Reverse current at V_R = 5 V	I_R	max.	200				nA
Diode capacitance at V_R = 0; f = 1 MHz	C_d	typ.	15				pF
		max.	25				pF

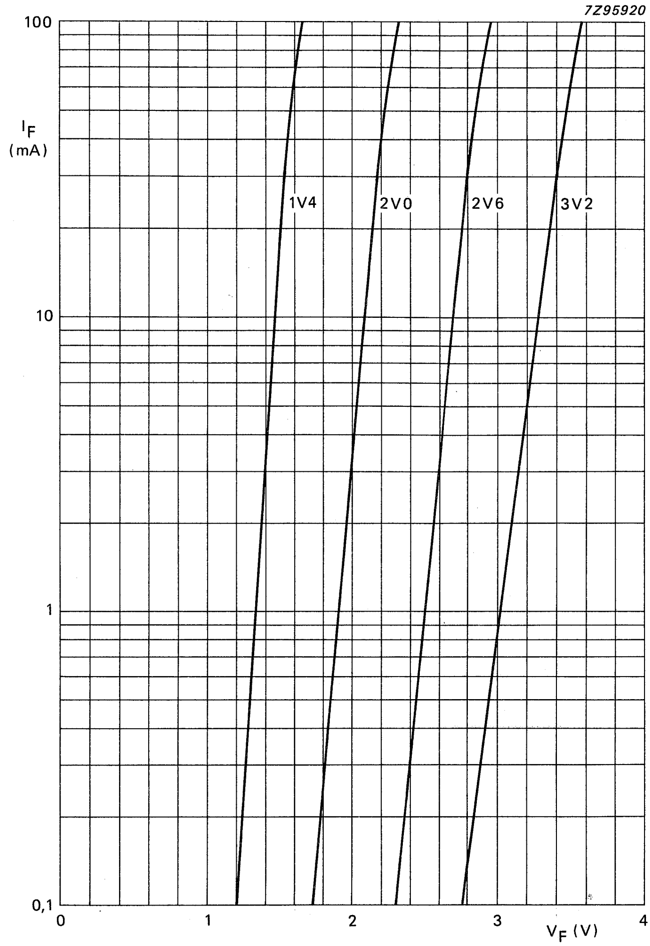


Fig. 2 Forward current as a function of forward voltage; T_j = 25 °C; typical values.

LOW VOLTAGE STABISTORS FOR SURFACE MOUNTING

Silicon planar integrated voltage regulator diodes in hermetically sealed SOD80 glass envelopes, intended for low power clipping, level shifting, voltage regulation, temperature stabilization of transistor base-emitter biasing network and in many other applications where tight tolerances and low voltage levels are required.
The series consists of four types with nominal voltages ranging from 1.4 to 3.2 V.

The SM diode is a leadless diode in a hermetically sealed glass SOD80 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.

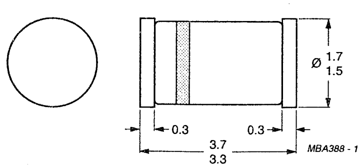
QUICK REFERENCE DATA

Regulation voltage range	V_F	nom.	1.4	2.0	2.6	3.2	V
Continuous reverse voltage	V_R	max.		10			V
Repetitive peak reverse voltage	V_{RRM}	max.		10			V
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		350			mW
Junction temperature	T_j	max.		150			°C
Differential resistance at I_F = 5 mA; f = 1 kHz	r_{diff}	typ.	10	15	18	20	Ω
		max.	20	30	32.5	35	Ω

MECHANICAL DATA

Dimensions in mm

Fig.1 SOD80.



Cathode indicated by yellow band.

RATINGS

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

			1.4	2.0	2.6	3.2	V
Repetitive peak forward current	I_{FRM}	max.	250		150		mA
Continuous reverse voltage	V_R	max.	10				V
Repetitive peak reverse voltage	V_{RRM}	max.	10				V
Total power dissipation (note 1) up to T_{amb} = 25 °C	P_{tot}	max.	330				mW
Storage temperature range	T_{stg}		−65 to 150				°C
Junction temperature	T_j	max.	150				°C

THERMAL RESISTANCE

From junction to ambient in free air (note 1)	$R_{th\,j\text{-}a}$	=	380	K/W

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			1.4	2.0	2.6	3.2	V
Regulation voltage range at I_F = 5 mA	V_F	min.	1.3	1.85	2.35	2.85	V
		max.	1.5	2.15	2.8	3.45	V
Differential resistance at I_F = 1 mA; f = 1 kHz	r_{diff}	typ.	55	80	90	100	Ω
at I_F = 5 mA; f = 1 kHz	r_{diff}	typ.	10	15	18	20	Ω
		max.	20	30	32.5	35	Ω
at I_F = 10 mA; f = 1 kHz	r_{diff}	typ.	6.0	8.0	9.0	10	Ω
		max.	10	15	17.5	20	Ω
Negative temperature coefficient at I_F = 5 mA	S_F	typ.	3.8	6.0	8.5	11.5	mV/K
Reverse current at V_R = 5 V	I_R	max.	200				nA
Diode capacitance at V_R = 0; f = 1 MHz	C_d	typ.	15				pF
		max.	25				pF

Note

1. Mounted on an epoxy-glass printed-circuit board measuring 15 mm x 10 mm x 0.8 mm.

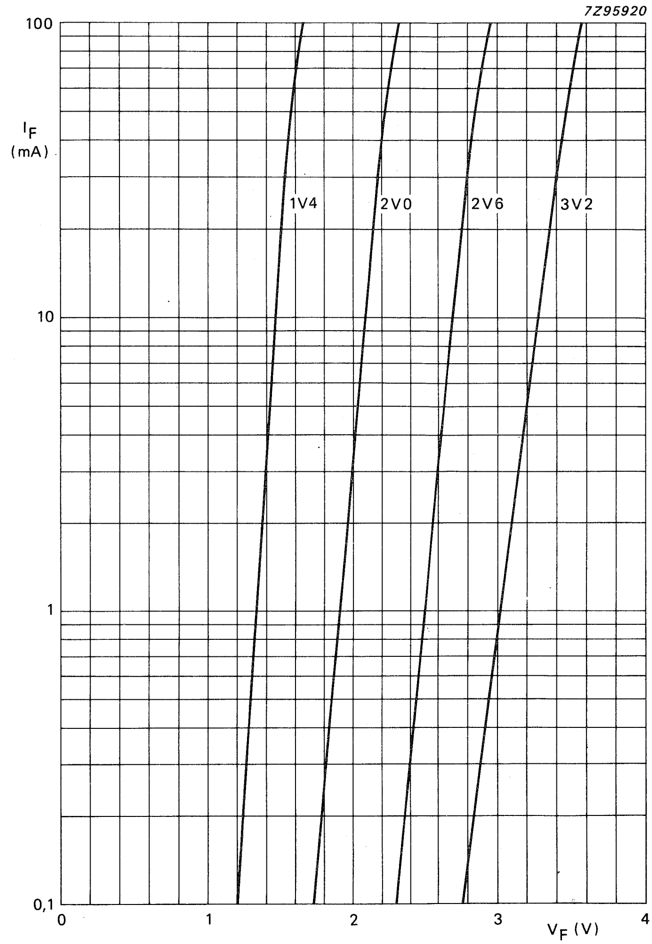


Fig. 2 Forward current as a function of forward voltage; T_j = 25 °C; typical values.

SILICON PLANAR VOLTAGE REGULATOR DIODES

Silicon planar voltage regulator diodes, in a SOT223 plastic envelope, intended for stabilization applications in thick and thin-film circuits.

The series covers the normalized range of nominal working voltages from 2.4 V to 75 V with a tolerance of ± 5% (international standard E24 range).

QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	2.4 to 75	V
Working voltage tolerance (E24 range)			±5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	1.3	W
Junction temperature	T_j	max.	150	°C

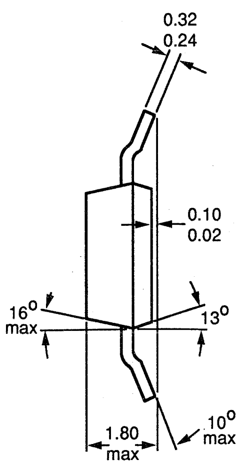
MECHANICAL DATA

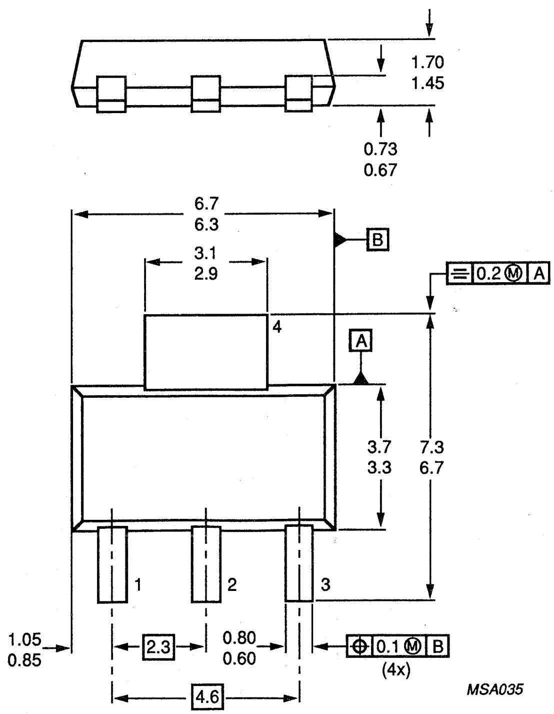
Dimensions in mm

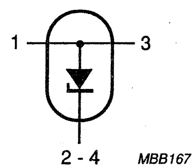
Fig.1 SOT223.

Pinning

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







RATINGS

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

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

THERMAL RESISTANCE

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

CHARACTERISTICS

T_j = 25 °C

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

Note

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

T_j = 25 °C

E24 logarithmic range (tolerance ± 5%)

BZV90-...	working voltage V_Z (V) at I_{Ztest} = 5 mA min.	max.	differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA typ.	max.	temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA min.	typ.	max.	diode capacitance C_d(pF); f = 1 MHz V_R = 0 typ.	max.
C2V4	2,2	2,6	70	100	−3,5	−1,6	0	375	450
C2V7	2,5	2,9	75	100	−3,5	−2,0	0	350	450
C3V0	2,8	3,2	80	95	−3,5	−2,1	0	350	450
C3V3	3,1	3,5	85	95	−3,5	−2,4	0	325	450
C3V6	3,4	3,8	85	90	−3,5	−2,4	0	300	450
C3V9	3,7	4,1	85	90	−3,5	−2,5	0	300	450
C4V3	4,0	4,6	80	90	−3,5	−2,5	0	275	450
C4V7	4,4	5,0	50	80	−3,5	−1,4	0,2	130	180
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	110	160
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	95	140
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	90	130
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	85	110
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	80	100
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	75	95
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	70	90
C10	9,4	10,6	8	20	4,5	6,4	8,0	70	90
C11	10,4	11,6	10	20	5,4	7,4	9,0	65	85
C12	11,4	12,7	10	25	6,0	8,4	10,0	65	85
C13	12,4	14,1	10	30	7,0	9,4	11,0	60	80
C15	13,8	15,6	10	30	9,2	11,4	13,0	55	75
C16	15,3	17,1	10	40	10,4	12,4	14,0	52	75
C18	16,8	19,1	10	45	12,4	14,4	16,0	47	70
C20	18,8	21,2	15	55	14,4	16,4	18,0	36	60
C22	20,8	23,3	20	55	16,4	18,4	20,0	34	60
C24	22,8	25,6	25	70	18,4	20,4	22,0	33	55
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA				
C27	25,1	28,9	25	80	21,4	23,4	25,3	30	50
C30	28,0	32,0	30	80	24,4	26,6	29,4	27	50
C33	31,0	35,0	35	80	27,4	29,7	33,4	25	45
C36	34,0	38,0	35	90	30,4	33,0	37,4	23	45
C39	37,0	41,0	40	130	33,4	36,4	41,2	21	45
C43	40,0	46,0	45	150	37,6	41,2	46,6	21	40
C47	44,0	50,0	50	170	42,0	46,1	51,8	19	40
C51	48,0	54,0	60	180	46,6	51,0	57,2	19	40
C56	52,0	60,0	70	200	52,2	57,0	63,8	18	40
C62	58,0	66,0	80	215	58,8	64,4	71,6	17	35
C68	64,0	72,0	90	240	65,6	71,7	79,8	17	35
C75	70,0	79,0	95	255	73,4	80,2	88,6	16,5	35

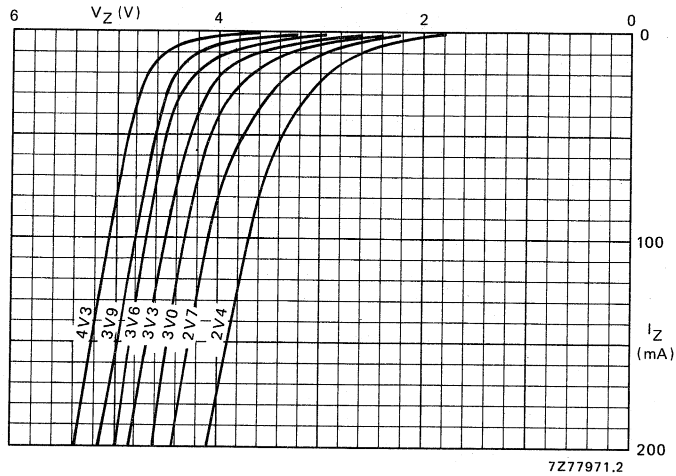


Fig. 2 Dynamic characteristics; typical values; T_j = 25 °C.

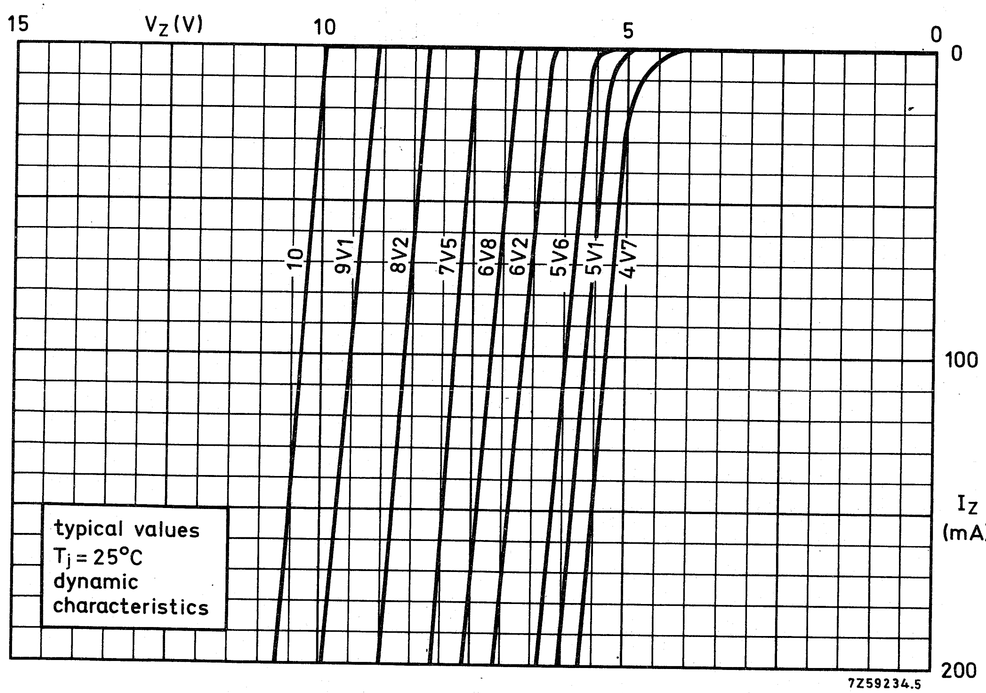


Fig. 3 Dynamic characteristics; typical values at T_j = 25 °C.

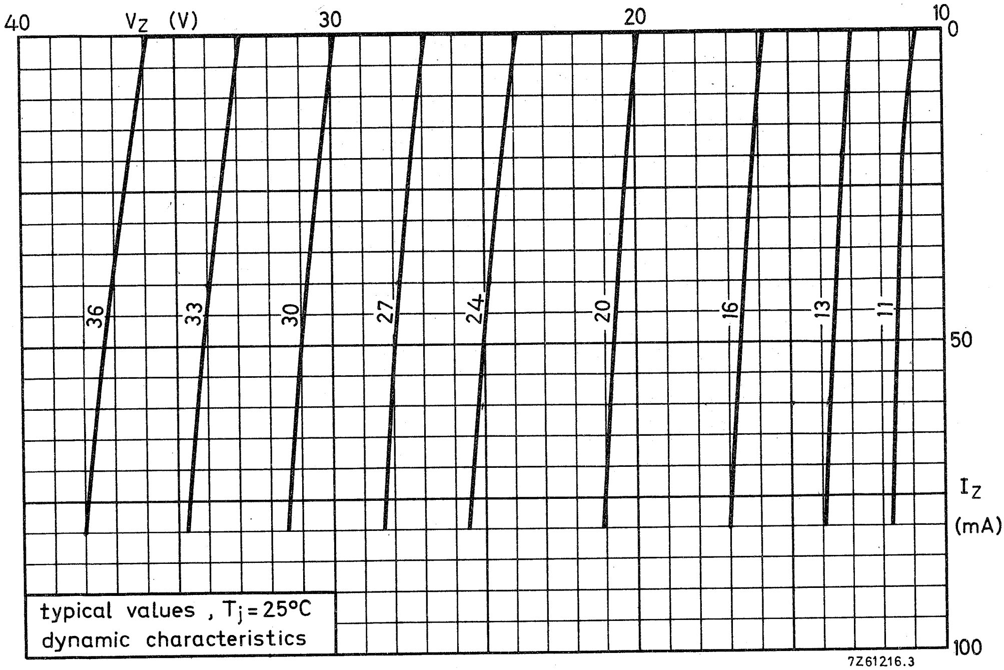


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

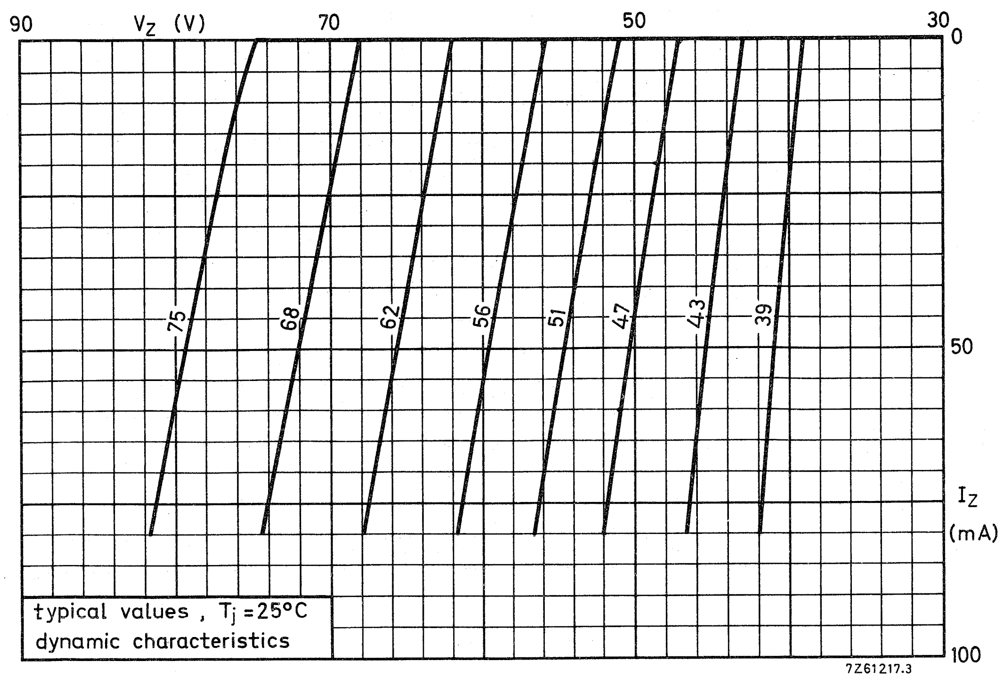


Fig. 5 Dynamic characteristics; typical values at T_j = 25 °C.

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

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

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

Calculating example

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

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

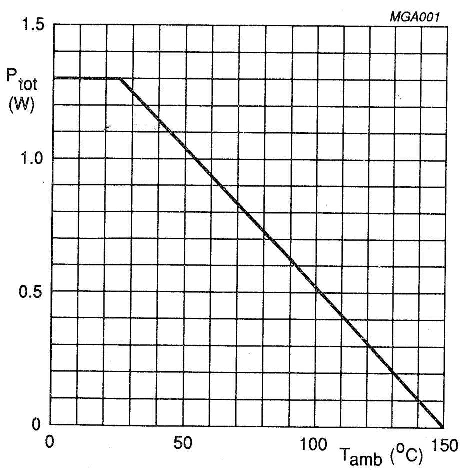


Fig. 6 Power derating curve.

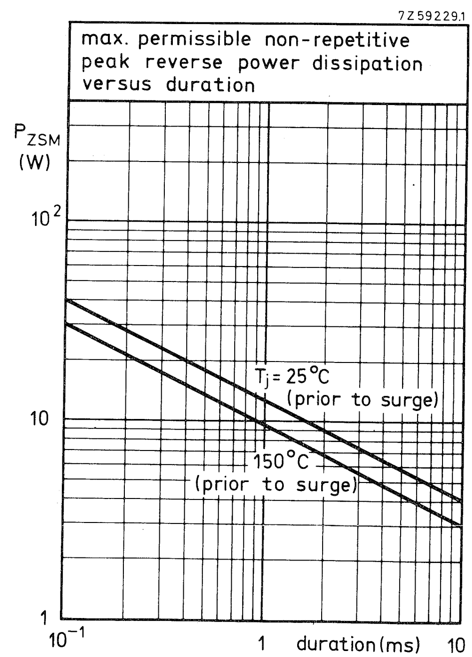


Fig. 7.

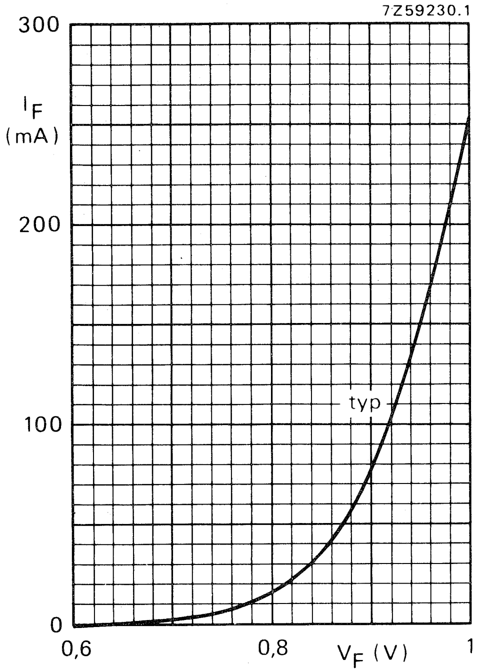


Fig. 8 T_j = 25 °C.

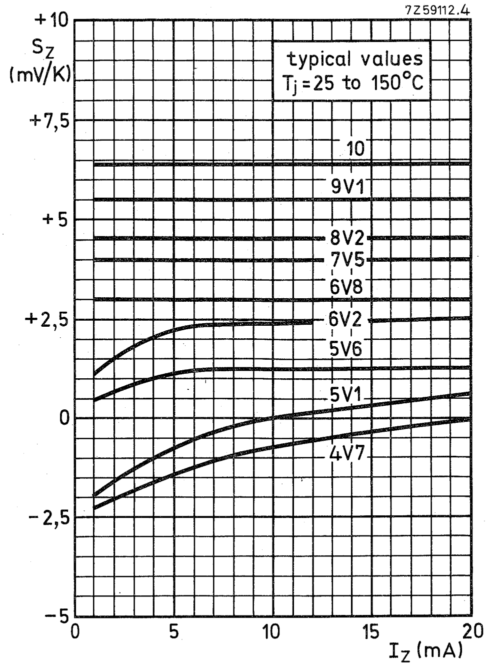


Fig. 9.

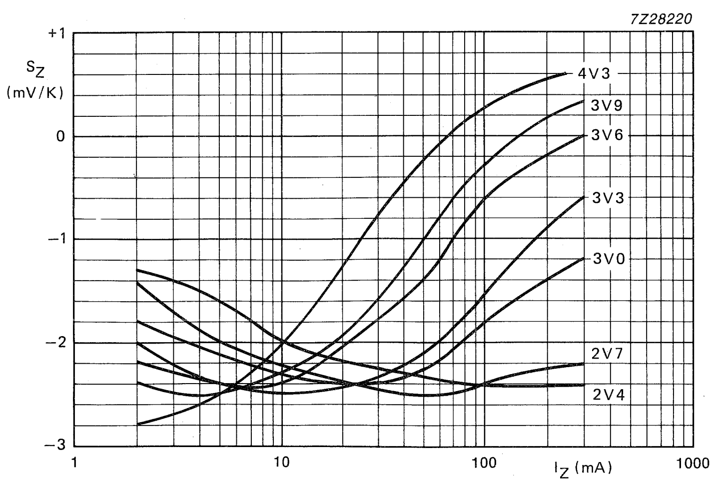


Fig. 10 Typical values temperature coefficient.

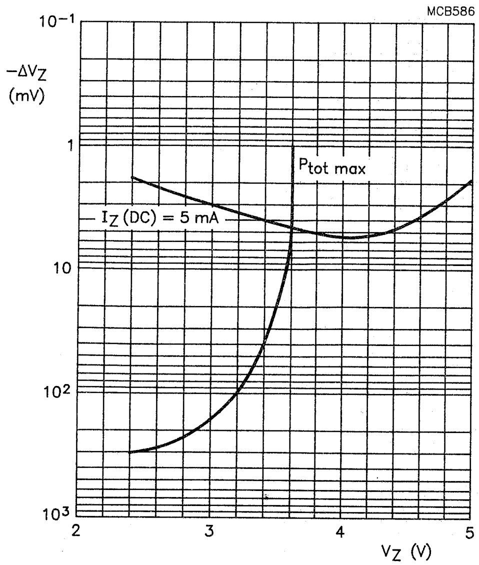


Fig. 11 Typical change of working voltage; T_j = 25 °C.

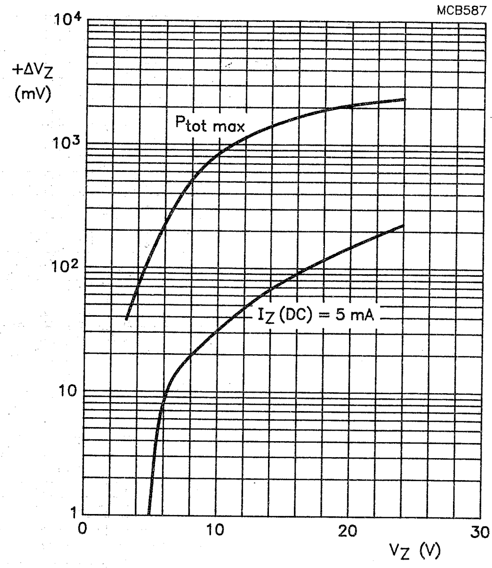


Fig. 12 Typical change of working voltage; T_j = 25 °C.

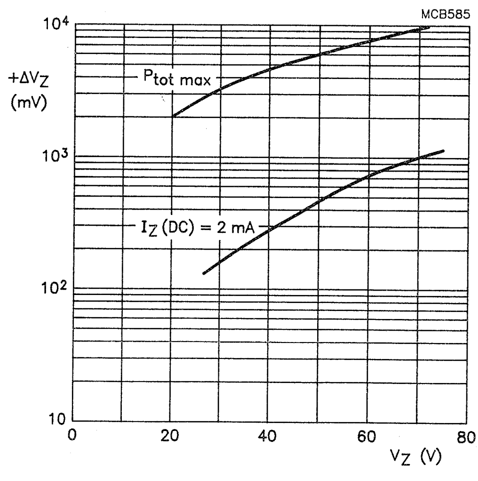


Fig. 13 Typical change of working voltage; T_j = 25 °C.

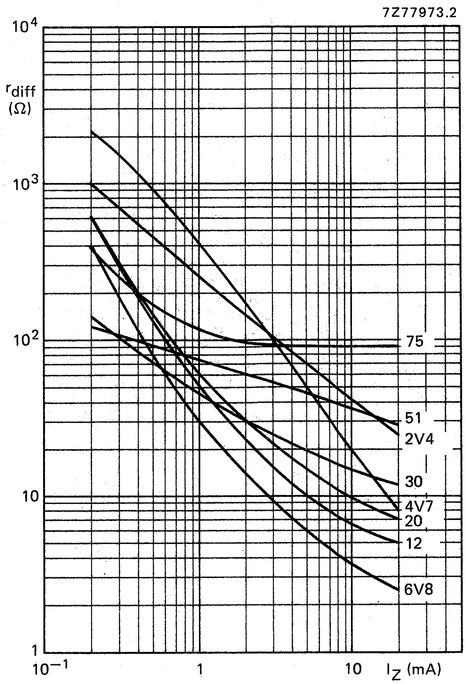


Fig. 14 Typical values; T_j = 25 °C; f = 1 kHz.

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-C510 in the normalized E24 range.

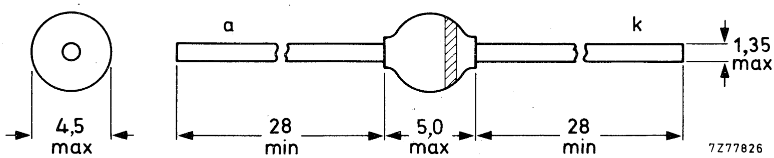
QUICK REFERENCE DATA

			voltage regulator	transient suppressor	
Working voltage range	V_Z	nom.	7,5 to 270		V
Stand-off voltage	V_R			6,2 to 430	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.

Products approved to CECC 50 005-019.

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

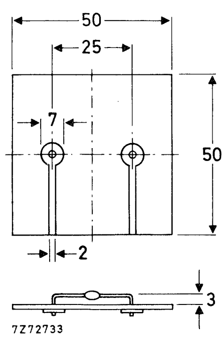


Fig. 2 Mounted on a printed-circuit board.

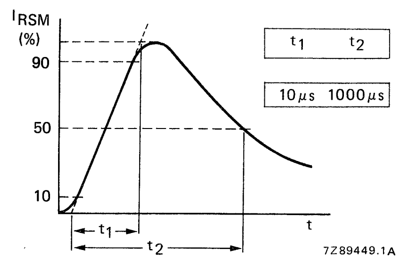


Fig. 3 Current pulse according to IEC 60-2, Section 6.

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.	nom.	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		reverse current at recommended stand-off voltage		
$V_{(CL)R}$ V	I_{RSM} A	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
419	1,2	10	240	C300
459	1,1	10	270	C330
498	1,0	10	300	C360
537	0,93	10	330	C390
603	0,83	10	360	C430
655	0,76	10	390	C470
707	0,71	10	430	C510

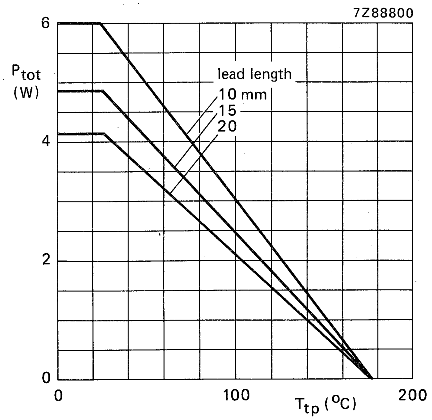


Fig. 4 Maximum total power dissipation as a function of tie-point temperature.

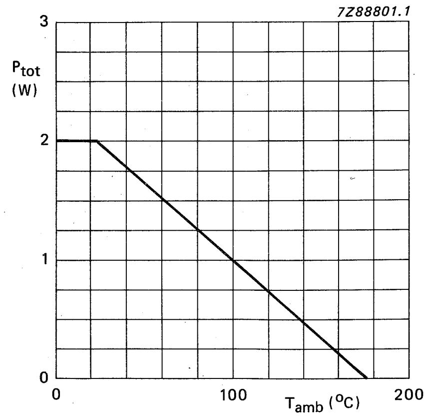


Fig. 5 Maximum total power dissipation as a function of ambient temperature, mounted as shown in Fig. 2.

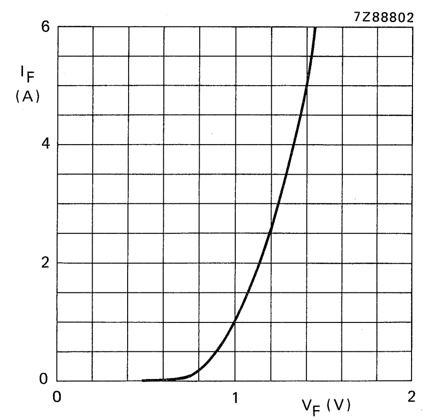


Fig. 6 Typical forward voltage drop at T_j = 25 °C.

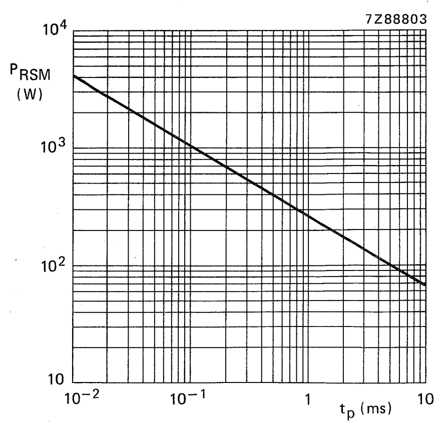


Fig. 7 Maximum non-repetitive peak reverse power dissipation; square current pulse; T_j = 25 °C prior to surge.

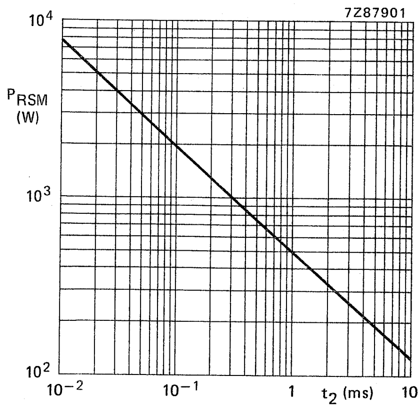


Fig. 8 Maximum non-repetitive peak reverse power dissipation; exponential pulse; T_j = 25 °C prior to surge.

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.

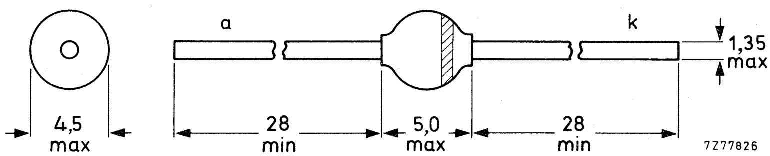
QUICK REFERENCE DATA

Stand-off voltage	V_R	max.	12 V
Non-repetitive peak reverse current	I_{RSM}	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

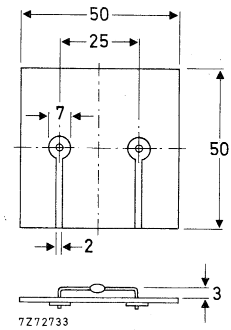


Fig. 2 Dimensions of printed-circuit board.

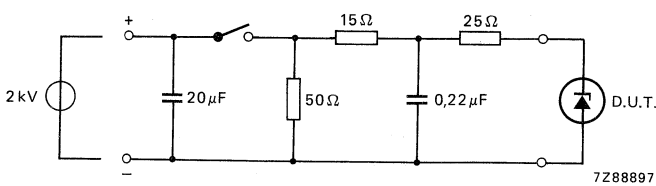


Fig. 3 Test set-up in accordance with FTZ 10/700.

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

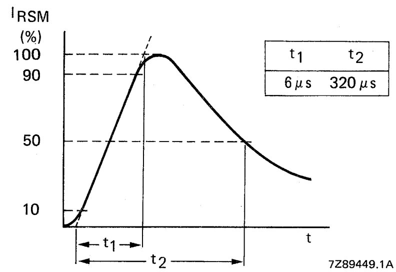


Fig. 4 Peak reverse current as a function of time.

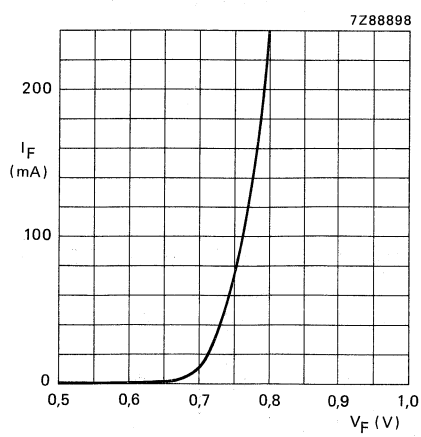


Fig. 5 Typical values forward voltage. T_j = 25 °C.

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

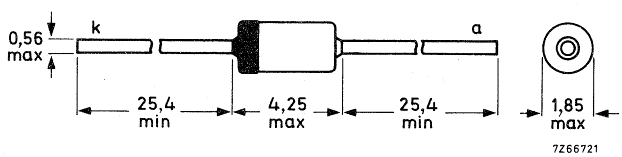
Working voltage range	V_Z	nom.	2,4 to 75	V
Total power dissipation*	P_{tot}	max.	500	mW
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	30	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to tie-point*	$R_{th\ j\text{-}tp}$	=	0,30	K/mW

* 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
The diodes are type-branded.

Products, approved to CECC 50 005-005.

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

Forward voltage

I_F = 100 mA	V_F	<	1,0	V

Reverse current

				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 °C.

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

BZX55-...	working voltage V_Z (V) at I_Z = 5 mA min.	working voltage V_Z (V) at I_Z = 5 mA max.	differential resistance r_{diff} (Ω) at I_Z = 5 mA max.	differential resistance r_{diff} (Ω) 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.	at I_Z = 2,5 mA 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

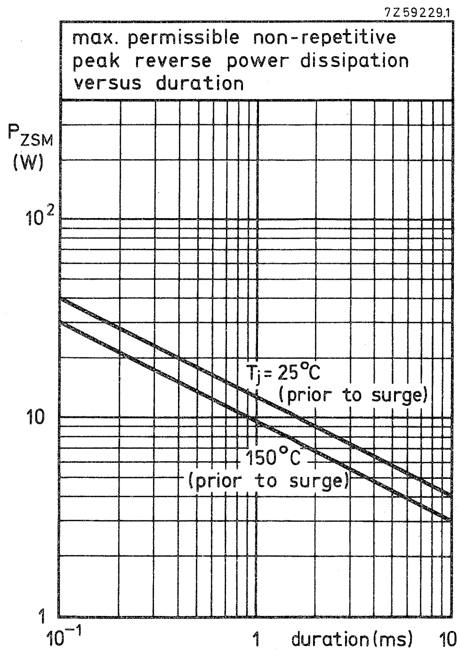


Fig. 2.

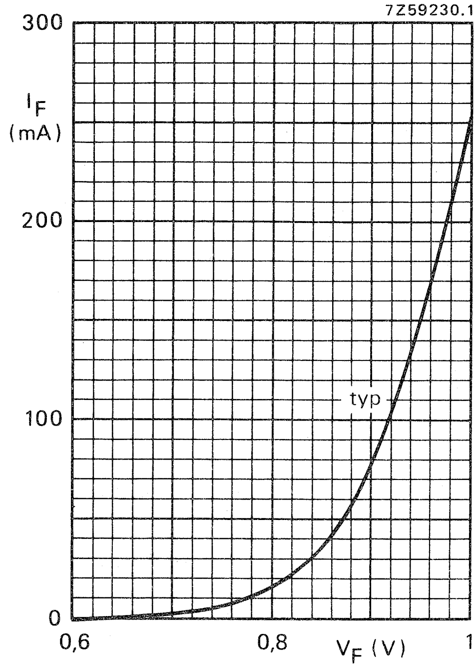


Fig. 3 $T_j = 25\ ^oC$.

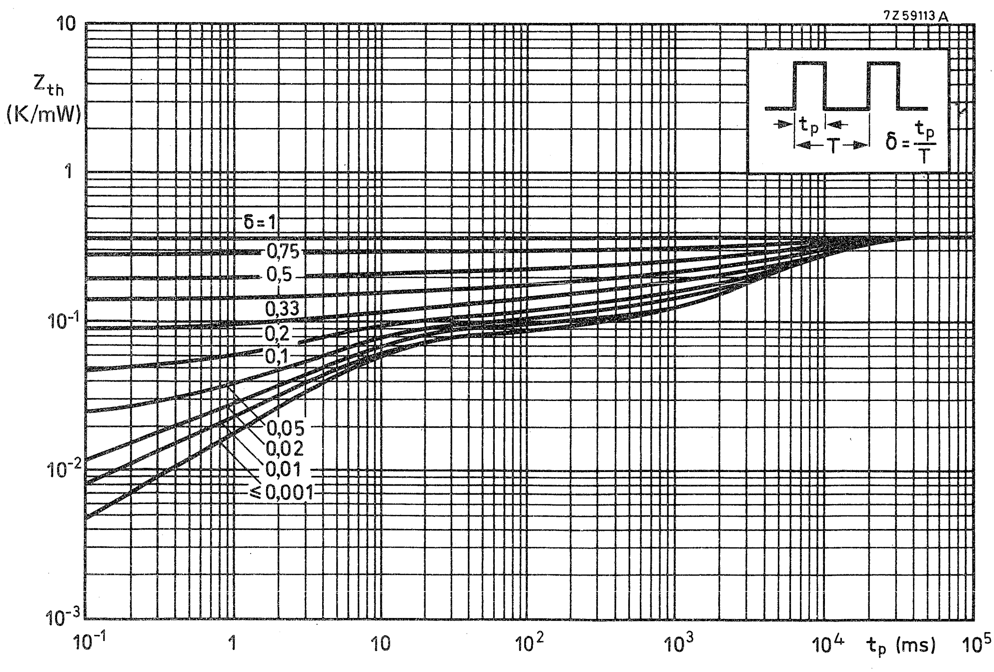


Fig. 4.

VOLTAGE REGULATOR DIODES

Silicon planar diodes in DO-35 envelopes intended for use as low voltage stabilizers or voltage references. They are available in four series; each series having a different tolerance rating, one series is to the international standardized E24 (± 5%) range, the other three have tolerances of 1%, 2% and 3% on working voltage. Each series consists of 37 types with nominal working voltages ranging from 2,4 V to 75 V.

QUICK REFERENCE DATA

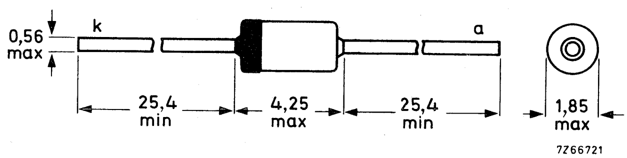
Working voltage range	V_Z	nom.	2,4 to 75	V
Total power dissipation	P_{tot}	max.	500	mW *
Non-repetitive peak reverse power dissipation	P_{ZSM}	max.	30	W
Junction temperature	T_j	max.	200	°C
Thermal resistance from junction to tie-point	$R_{th\ j\text{-}tp}$	=	0,30	K/mW *

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

MECHANICAL DATA

Dimensions in mm

Fig.1 DO-35 (SOD27).



Cathode indicated by coloured band.
The diodes are type-branded.

Products approved to CECC 50 005-005.

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	^oC
Junction temperature	T_j	max.	200	^oC

THERMAL RESISTANCE

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

CHARACTERISTICS

$T_j = 25\ ^oC$

Forward voltage $I_F = 10$ 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

. = A for 1% tolerance range
. = B for 2% tolerance range
. = F for 3% tolerance range
. = C for E24 (± 5%) tolerance range

* If leads are kept at $T_{tp} = 50\ ^oC$ at 8 mm from body.
** In still air at maximum lead length up to $T_{amb} = 50\ ^oC$.

T_j = 25 °C
± 1% tolerance range

BZX79A	working voltage V_Z (V) at I_{Ztest} = 5 mA		differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA		temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
A2V4	2,37	2,43	70	100	−3,5	−1,6	0	275	600
A2V7	2,67	2,73	75	100	−3,5	−2,0	0	300	600
A3V0	2,97	3,03	80	95	−3,5	−2,1	0	325	600
A3V3	3,26	3,34	85	95	−3,5	−2,4	0	350	600
A3V6	3,56	3,64	85	90	−3,5	−2,4	0	375	600
A3V9	3,86	3,94	85	90	−3,5	−2,5	0	400	600
A4V3	4,25	4,35	80	90	−3,5	−2,5	0	410	600
A4V7	4,65	4,75	50	80	−3,5	−1,4	0,2	425	500
A5V1	5,04	5,16	40	60	−2,7	−0,8	1,2	400	480
A5V6	5,54	5,66	15	40	−2,0	1,2	2,5	80	400
A6V2	6,13	6,27	6	10	0,4	2,3	3,7	40	150
A6V8	6,73	6,87	6	15	1,2	3,0	4,5	30	80
A7V5	7,42	7,58	6	15	2,5	4,0	5,3	30	80
A8V2	8,11	8,29	6	15	3,2	4,6	6,2	40	80
A9V1	9,00	9,20	6	15	3,8	5,5	7,0	40	100
A10	9,90	10,10	8	20	4,5	6,4	8,0	50	150
A11	10,89	11,11	10	20	5,4	7,4	9,0	50	150
A12	11,88	12,12	10	25	6,0	8,4	10,0	50	150
A13	12,87	13,13	10	30	7,0	9,4	11,0	50	170
A15	14,85	15,15	10	30	9,2	11,4	13,0	50	200
A16	15,84	16,16	10	40	10,4	12,4	14,0	50	200
A18	17,82	18,18	10	45	12,4	14,4	16,0	50	225
A20	19,80	20,20	15	55	14,4	16,4	18,0	60	225
A22	21,78	22,22	20	55	16,4	18,4	20,0	60	250
A24	23,76	24,24	25	70	18,4	20,4	22,0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0,5 mA	
A27	26,73	27,27	25	80	21,4	23,4	25,3	65	300
A30	29,70	30,30	30	80	24,4	26,6	29,4	70	300
A33	32,67	33,33	35	80	27,4	29,7	33,4	75	325
A36	35,64	36,36	35	90	30,4	33,0	37,4	80	350
A39	38,61	39,39	40	130	33,4	36,4	41,2	80	350
A43	42,57	43,43	45	150	37,6	41,2	46,6	85	375
A47	46,53	47,47	50	170	42,0	46,1	51,8	85	375
A51	50,49	51,51	60	180	46,6	51,0	57,2	90	400
A56	55,44	56,56	70	200	52,2	57,0	63,8	100	425
A62	61,38	62,62	80	215	58,8	64,4	71,6	120	450
A68	67,32	68,68	90	240	65,6	71,7	79,8	150	475
A75	74,25	75,75	95	255	73,4	80,2	88,6	170	500

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

*When the real value is beyond this limit it is regulated as acceptable when it is within the 2% tolerance range.

T_j = 25 °C
± 3% 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/K) at I_{Ztest} = 5 mA	leakage current I_R at V_R	
	min.	max.	typ.	max.	typ.	μA	V
F2V4	2,33	2,47	70	100	−1,6	50	1
F2V7	2,62	2,78	75	100	−2,0	20	1
F3V0	2,91	3,09	80	100	−2,1	10	1
F3V3	3,20	3,40	85	100	−2,4	5	1
F3V6	3,49	3,71	85	100	−2,4	5	1
F3V9	3,78	4,02	85	100	−2,5	3	1
F4V3	4,17	4,43	80	100	−2,5	3	1
F4V7	4,56	4,84	50	100	−1,4	3	2
F5V1	4,95	5,25	40	80	−0,8	2	2
F5V6	5,43	5,77	15	40	1,2	1	2
F6V2	6,01	6,39	6	30	2,3	3	4
F6V8	6,60	7,00	6	20	3,0	2	4
F7V5	7,28	7,72	6	20	4,0	1	5
F8V2	7,95	8,45	6	20	4,6	0,7	5
F9V1	8,83	9,37	6	20	5,5	0,5	6
F10	9,70	10,30	8	25	6,4	0,2	7
F11	10,67	11,33	10	25	7,4	0,1	8
F12	11,64	12,36	10	25	8,4	0,1	8
F13	12,61	13,39	10	35	9,4	0,1	8
F15	14,55	15,45	10	40	11,4	0,05	10
F16	15,50	16,50	10	45	12,4	0,05	
F18	17,50	18,50	10	50	14,4	0,05	
F20	19,40	20,60	15	60	16,4	0,05	
F22	21,30	22,70	20	70	18,4	0,05	
F24	23,30	24,70	25	80	20,4	0,05	
	at I_{Ztest} = 2 mA		**at I_{Ztest} = 2 mA**		**at I_{Ztest} = 2 mA**	**at I_Z = 0,5 mA**	
F27	26,20	27,80	25	80	23,4	0,05	0,7
F30	29,10	30,90	30	100	26,6	0,05	0,7
F33	32,00	34,00	35	120	29,7	0,05	0,7
F36	34,90	37,10	35	140	33,0	0,05	0,7
F39	37,80	40,20	40	150	36,4	0,05	0,7
F43	41,70	44,30	45	160	41,2	0,05	0,7
F47	45,60	48,40	50	170	46,1	0,05	0,7
F51	49,50	52,50	60	180	51,0	0,05	0,7
F56	54,30	57,70	70	200	57,0	0,05	0,7
F62	60,10	63,90	80	220	64,4	0,05	0,7
F68	66,00	70,00	90	240	71,7	0,05	0,7
F75	72,80	77,20	95	255	80,2	0,05	0,7

T_j = 25 °C
E24 (± 5%) logarithmic 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/K) at I_{Ztest} = 5 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
C2V4	2,2	2,6	70	100	−3,5	−1,6	0	275	600
C2V7	2,5	2,9	75	100	−3,5	−2,0	0	300	600
C3V0	2,8	3,2	80	95	−3,5	−2,1	0	325	600
C3V3	3,1	3,5	85	95	−3,5	−2,4	0	350	600
C3V6	3,4	3,8	85	90	−3,5	−2,4	0	375	600
C3V9	3,7	4,1	85	90	−3,5	−2,5	0	400	600
C4V3	4,0	4,6	80	90	−3,5	−2,5	0	410	600
C4V7	4,4	5,0	50	80	−3,5	−1,4	0,2	425	500
C5V1	4,8	5,4	40	60	−2,7	−0,8	1,2	400	480
C5V6	5,2	6,0	15	40	−2,0	1,2	2,5	80	400
C6V2	5,8	6,6	6	10	0,4	2,3	3,7	40	150
C6V8	6,4	7,2	6	15	1,2	3,0	4,5	30	80
C7V5	7,0	7,9	6	15	2,5	4,0	5,3	30	80
C8V2	7,7	8,7	6	15	3,2	4,6	6,2	40	80
C9V1	8,5	9,6	6	15	3,8	5,5	7,0	40	100
C10	9,4	10,6	8	20	4,5	6,4	8,0	50	150
C11	10,4	11,6	10	20	5,4	7,4	9,0	50	150
C12	11,4	12,7	10	25	6,0	8,4	10,0	50	150
C13	12,4	14,1	10	30	7,0	9,4	11,0	50	170
C15	13,8	15,6	10	30	9,2	11,4	13,0	50	200
C16	15,3	17,1	10	40	10,4	12,4	14,0	50	200
C18	16,8	19,1	10	45	12,4	14,4	16,0	50	225
C20	18,8	21,2	15	55	14,4	16,4	18,0	60	225
C22	20,8	23,3	20	55	16,4	18,4	20,0	60	250
C24	22,8	25,6	25	70	18,4	20,4	22,0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0,5 mA	
C27	25,1	28,9	25	80	21,4	23,4	25,3	65	300
C30	28,0	32,0	30	80	24,4	26,6	29,4	70	300
C33	31,0	35,0	35	80	27,4	29,7	33,4	75	325
C36	34,0	38,0	35	90	30,4	33,0	37,4	80	350
C39	37,0	41,0	40	130	33,4	36,4	41,2	80	350
C43	40,0	46,0	45	150	37,6	41,2	46,6	85	375
C47	44,0	50,0	50	170	42,0	46,1	51,8	85	375
C51	48,0	54,0	60	180	46,6	51,0	57,2	90	400
C56	52,0	60,0	70	200	52,2	57,0	63,8	100	425
C62	58,0	66,0	80	215	58,8	64,4	71,6	120	450
C68	64,0	72,0	90	240	65,6	71,7	79,8	150	475
C75	70,0	79,0	95	255	73,4	80,2	88,6	170	500

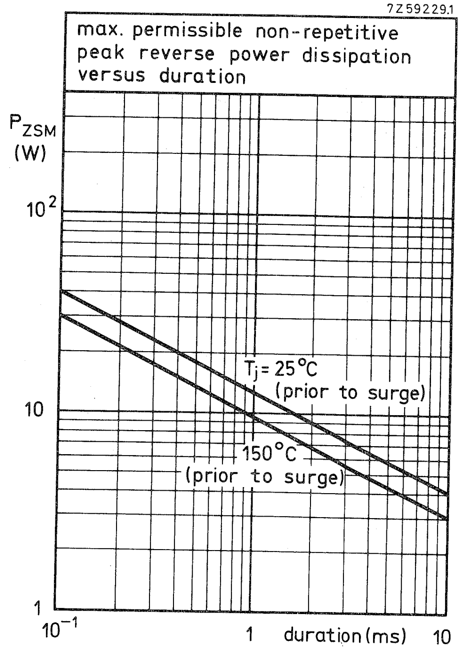

7Z59229.1
max. permissible non-repetitive peak reverse power dissipation versus duration
P_{ZSM} (W)
10^2
10
1
10^{-1}
1
duration (ms)
10
T_j = 25 °C (prior to surge)
150 °C (prior to surge)

Fig. 2.

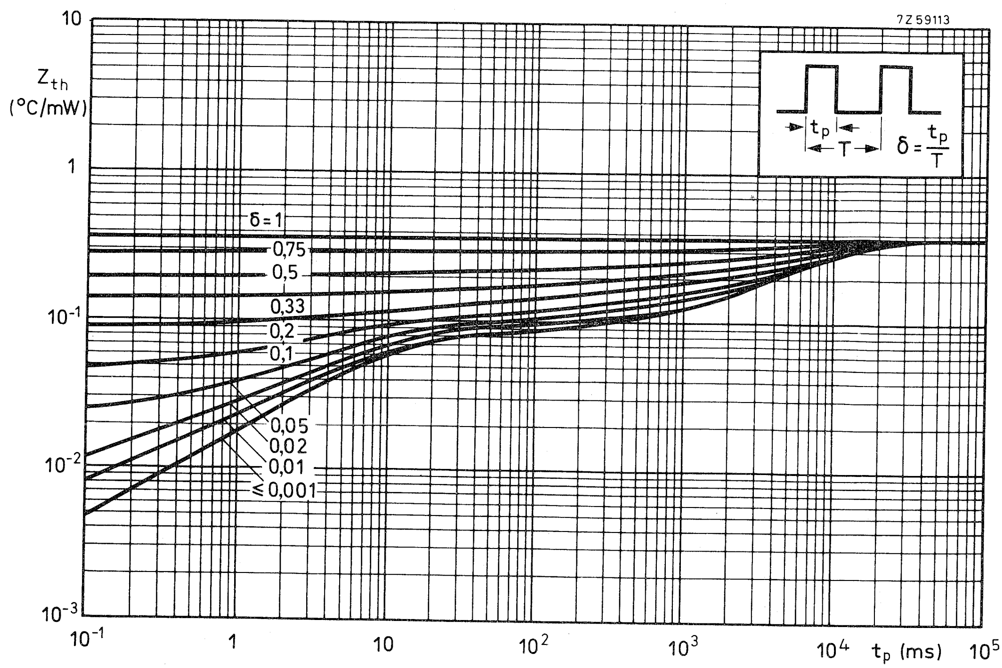

7Z59113
10
Z_{th} (°C/mW)
1
10^{-1}
10^{-2}
10^{-3}
δ = 1
0,75
0,5
0,33
0,2
0,1
0,05
0,02
0,01
≤ 0,001
t_p
T
$\delta = \frac{t_p}{T}$
10^{-1}
1
10
10^2
10^3
10^4
t_p (ms)
10^5

Fig. 3.

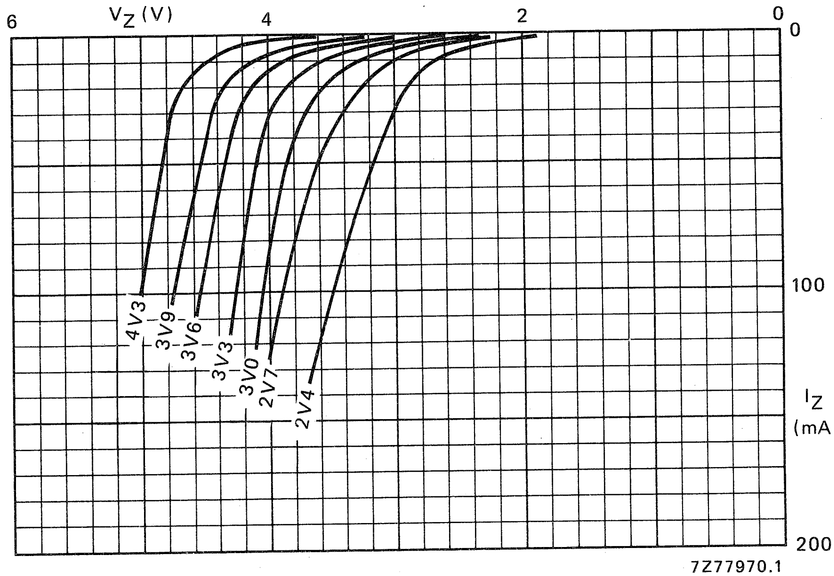


Fig. 4 Static characteristics; typical values; T_{amb} = 25 °C.

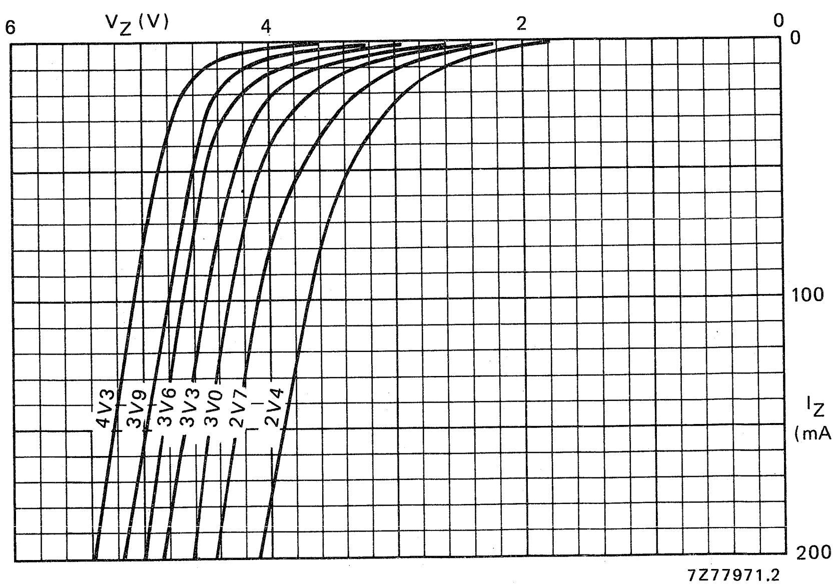


Fig. 5 Dynamic characteristics; typical values; T_j = 25 °C.

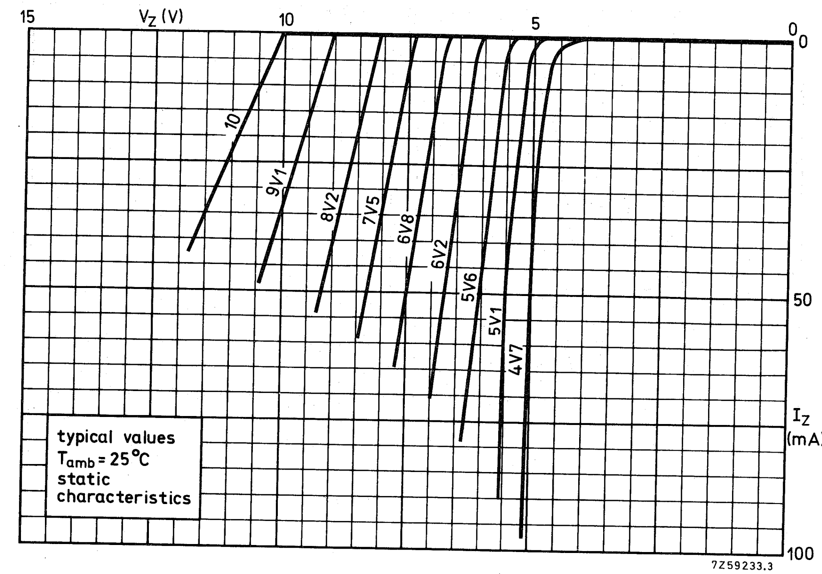

15
V_Z (V)
10
5
0
0
50
100
I_Z (mA)
10
9V1
8V2
7V5
6V8
6V2
5V6
5V1
4V7
typical values
T_{amb} = 25 °C
static
characteristics
7Z59233.3

Fig. 6.

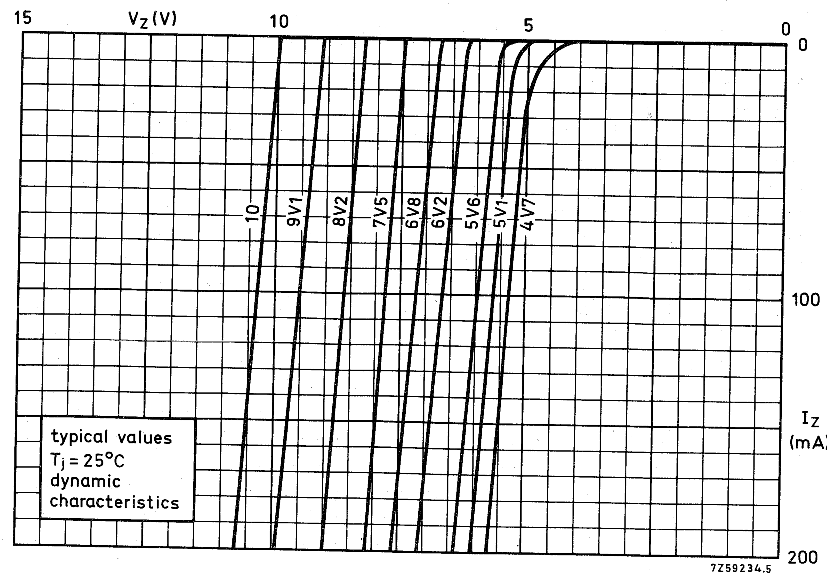

15
V_Z (V)
10
5
0
0
100
200
I_Z (mA)
10
9V1
8V2
7V5
6V8
6V2
5V6
5V1
4V7
typical values
T_j = 25 °C
dynamic
characteristics
7Z59234.5

Fig. 7.

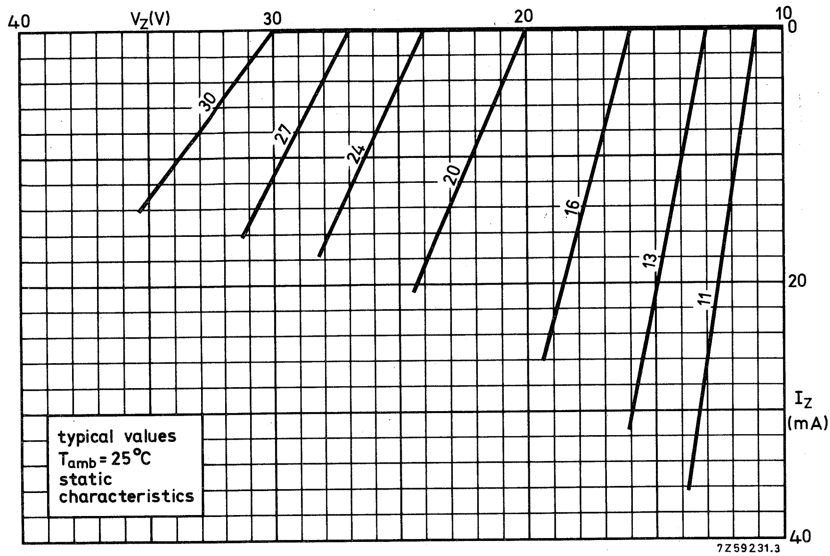

40
V_Z(V)
30
20
10
0
30
27
24
20
16
13
11
20
I_Z
(mA)
40
typical values
T_{amb} = 25 °C
static
characteristics
7Z59231.3

Fig. 8.

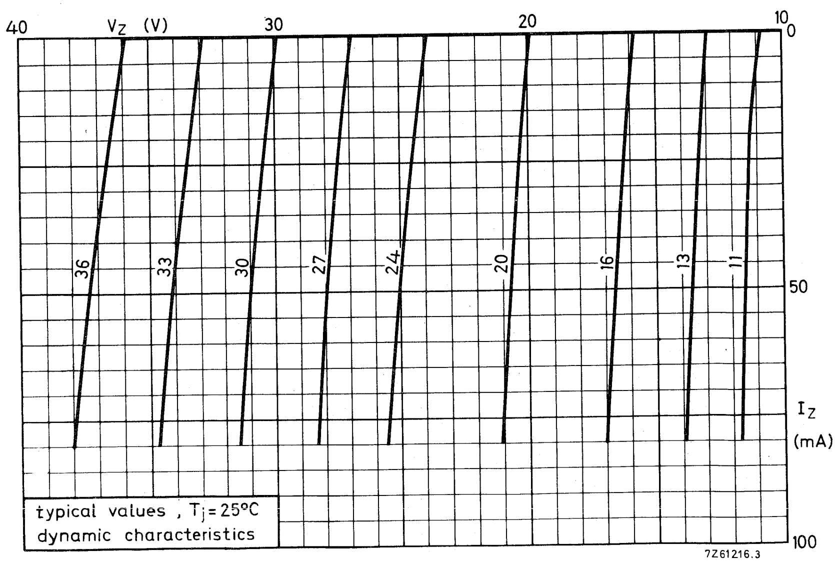

40
V_Z (V)
30
20
10
0
36
33
30
27
24
20
16
13
11
50
I_Z
(mA)
100
typical values , T_j = 25 °C
dynamic characteristics
7Z61216.3

Fig. 9.

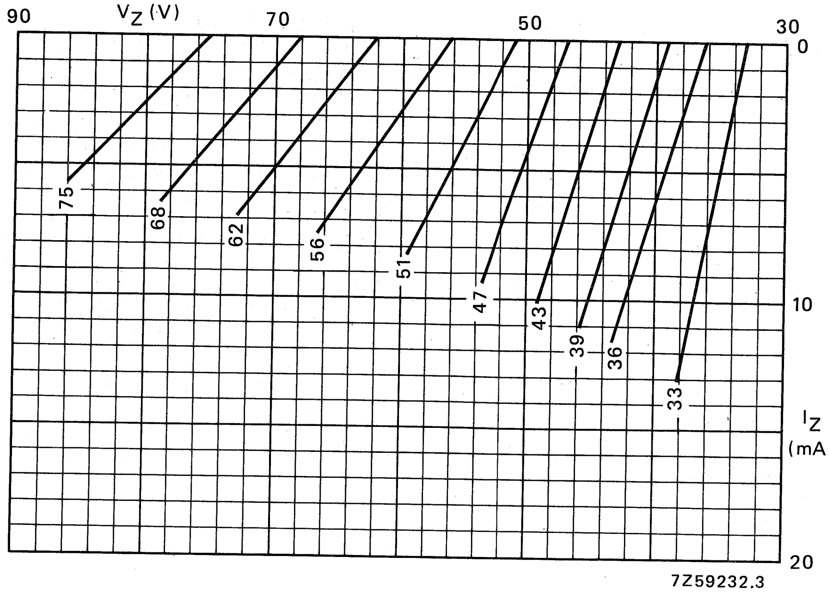


Fig. 10 Static characteristics; typical values; T_{amb} = 25 °C.

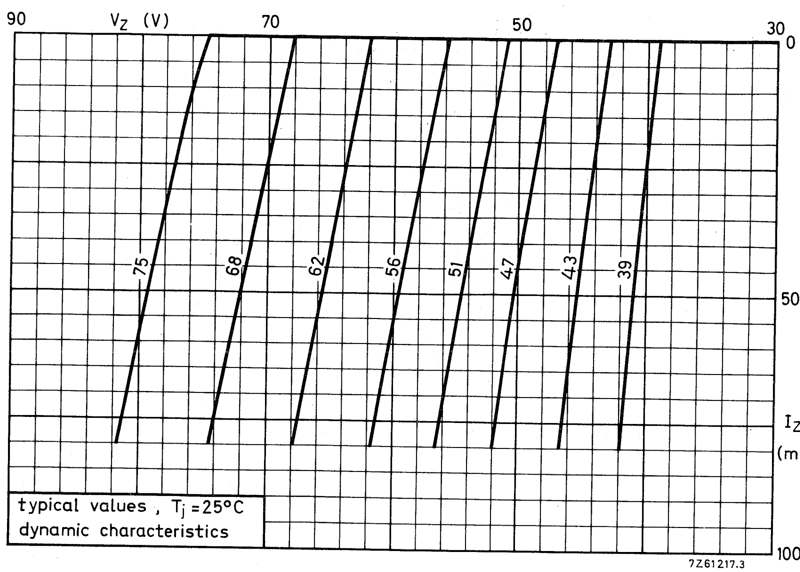


Fig. 11.

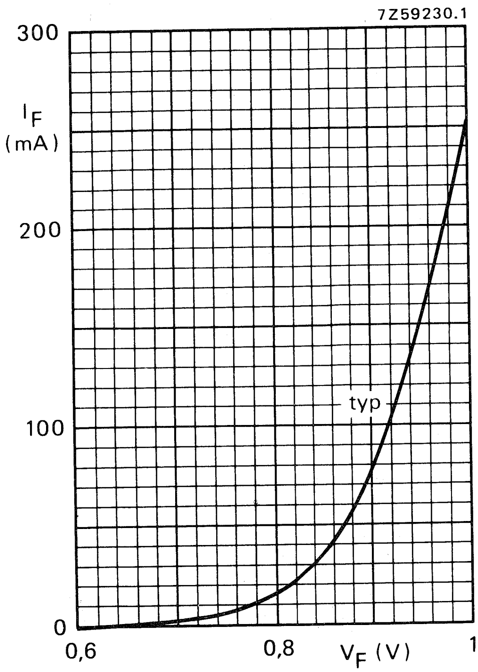


Fig. 12 T_j = 25 °C.

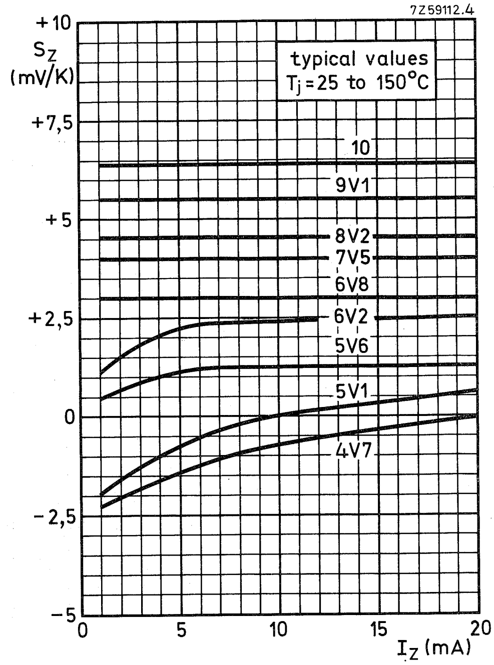


Fig. 13.

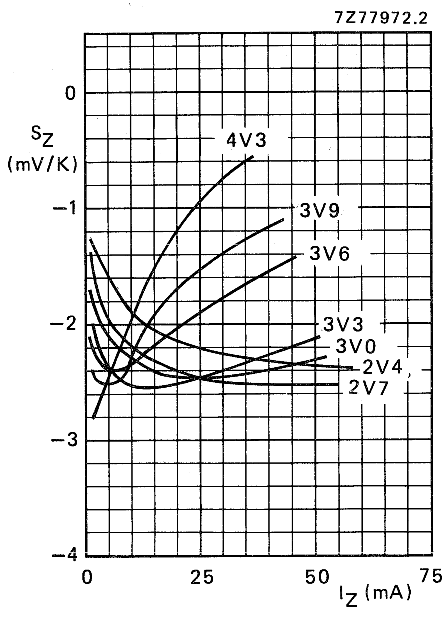


Fig. 14 Typical values; T_j = 25 to 150 °C.

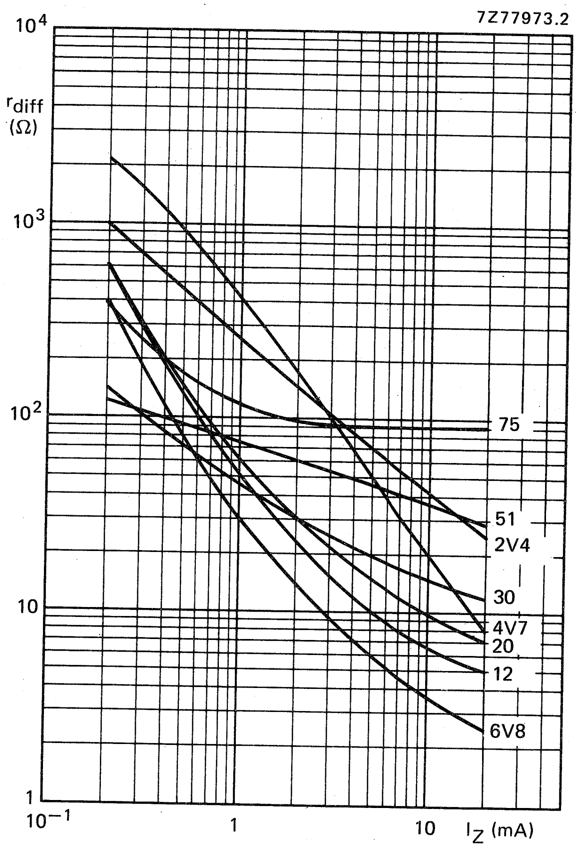


Fig. 15 Typical values; T_j = 25 °C; f = 1 kHz.

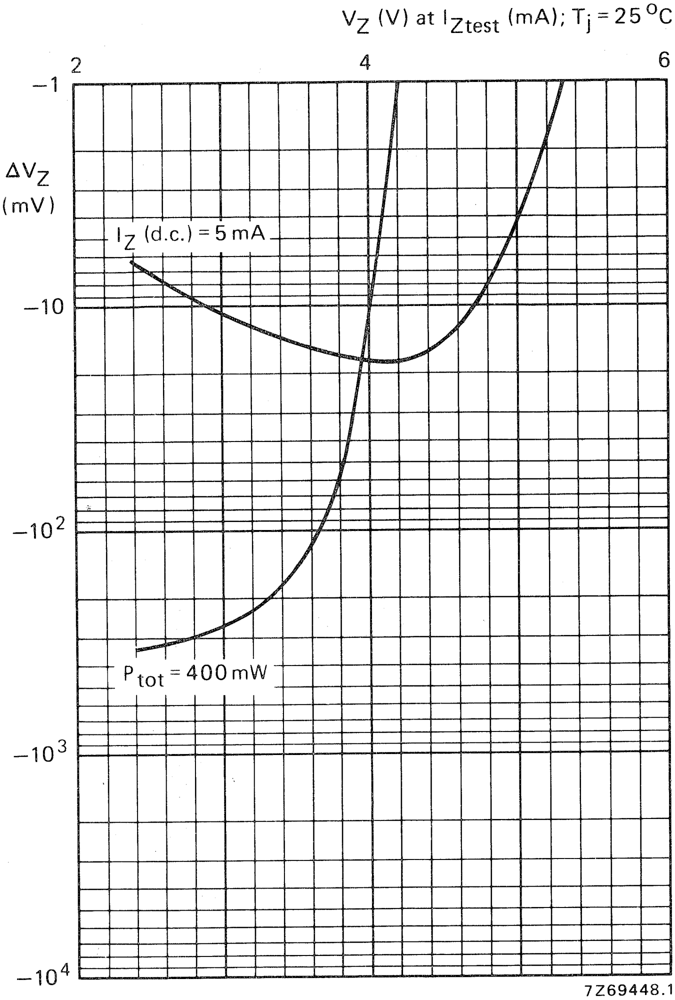


Fig. 16 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

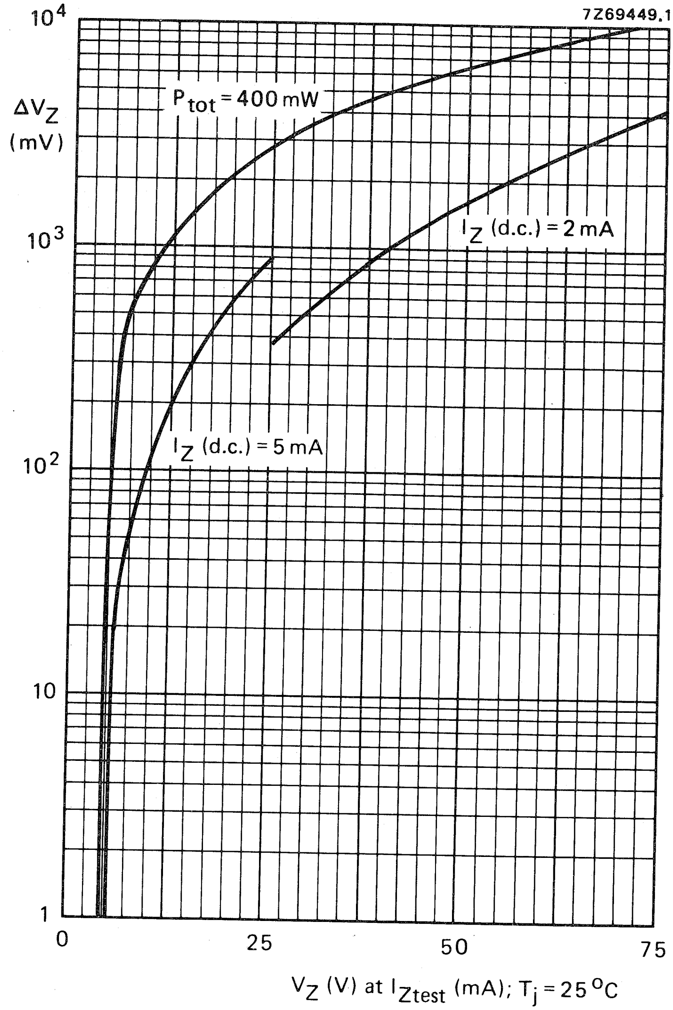


Fig. 17 Typical change of working voltage under operating conditions at T_{amb} = 25 °C.

SILICON PLANAR VOLTAGE REGULATOR DIODES

Low power general purpose voltage regulator diodes in a micro miniature plastic envelope. They are available in three series; one to the international standardized E24 (± 5%) range, one in a tolerance of ± 2% and the other in a tolerance of ± 1%. The C5V1 is CECC approved to 50 005-21.
Each series consists of 37 types with nominal working voltages from 2.4 V to 75 V.

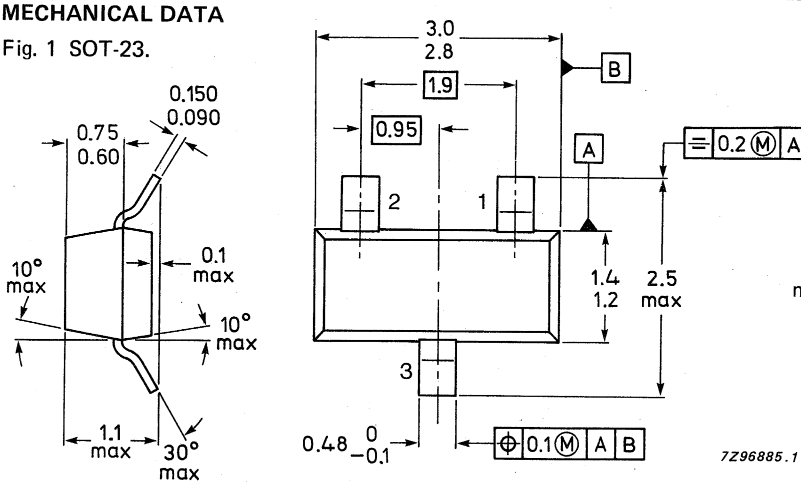
QUICK REFERENCE DATA

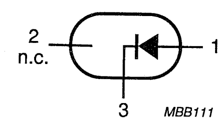
Working voltage range	V_Z	nom.	2.4 to 75	V
Working voltage tolerance			± 5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C

MECHANICAL DATA

Fig. 1 SOT-23.

Dimensions in mm





See also *Soldering recommendations.*

Marking code

BZX84-C2V4 = Z11	BZX84-C5V6 = Z3p	BZX84-C13 = Y3p	BZX84-C33 = Y12
C2V7 = Z12	C6V2 = Z4p	C15 = Y4p	C36 = Y13
C3V0 = Z13	C6V8 = Z5p	C16 = Y5p	C39 = Y14
C3V3 = Z14	C7V5 = Z6p	C18 = Y6p	C43 = Y15
C3V6 = Z15	C8V2 = Z7p	C20 = Y7p	C47 = Y16
C3V9 = Z16	C9V1 = Z8p	C22 = Y8p	C51 = Y17
C4V3 = Z17	C10 = Z9p	C24 = Y9p	C56 = Y18
C4V7 = Z1p	C11 = Y1p	C27 = Y10	C62 = Y19
C5V1 = Z2p	C12 = Y2p	C30 = Y11	C68 = Y20
			C75 = Y21

Marking for B and A types available on request.

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.	300 mW
Storage temperature	T_{stg}	−65 to + 150 °C	
Junction temperature	T_j	max.	150 °C

THERMAL CHARACTERISTICS*

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 = 10 mA		V_F	<	0.9 V
Reverse current				
BZX84–.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	V_R = 8 V	I_R	<	100 nA
12	V_R = 8 V	I_R	<	100 nA
13	V_R = 8 V	I_R	<	100 nA
15 to 75	V_R = 0.7 V_{Znom}	I_R	<	50 nA

. = A for 1%
. = B for 2%
.. = C for (E24), 5%

* Device mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

T_j = 25 °C
± 5% tolerance range

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/K) at I_{Ztest} = 5 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
C2V4	2.20	2.60	70	100	−3.5	−1.6	0	275	600
C2V7	2.50	2.90	75	100	−3.5	−2.0	0	300	600
C3V0	2.80	3.20	80	95	−3.5	−2.1	0	325	600
C3V3	3.10	3.50	85	95	−3.5	−2.4	0	350	600
C3V6	3.40	3.80	85	90	−3.5	−2.4	0	375	600
C3V9	3.70	4.10	85	90	−3.5	−2.5	0	400	600
C4V3	4.00	4.60	80	90	−3.5	−2.5	0	410	600
C4V7	4.40	5.00	50	80	−3.5	−1.4	0.2	425	500
C5V1	4.80	5.40	40	60	−2.7	−0.8	1.2	400	480
C5V6	5.20	6.00	15	40	−2.0	1.2	2.5	80	400
C6V2	5.80	6.60	6	10	0.4	2.3	3.7	40	150
C6V8	6.40	7.20	6	15	1.2	3.0	4.5	30	80
C7V5	7.00	7.90	6	15	2.5	4.0	5.3	30	80
C8V2	7.70	8.70	6	15	3.2	4.6	6.2	40	80
C9V1	8.50	9.60	6	15	3.8	5.5	7.0	40	100
C10	9.40	10.60	8	20	4.5	6.4	8.0	50	150
C11	10.40	11.60	10	20	5.4	7.4	9.0	50	150
C12	11.40	12.70	10	25	6.0	8.4	10.0	50	150
C13	12.40	14.10	10	30	7.0	9.4	11.0	50	170
C15	13.80	15.60	10	30	9.2	11.4	13.0	50	200
C16	15.30	17.10	10	40	10.4	12.4	14.0	50	200
C18	16.80	19.10	10	45	12.4	14.4	16.0	50	225
C20	18.80	21.20	15	55	14.4	16.4	18.0	60	225
C22	20.80	23.30	20	55	16.4	18.4	20.0	60	250
C24	22.80	25.60	25	70	18.4	20.4	22.0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0.5 mA	
C27	25.10	28.90	25	80	21.4	23.4	25.3	65	300
C30	28.00	32.00	30	80	24.4	26.6	29.4	70	300
C33	31.00	35.00	35	80	27.4	29.7	33.4	75	325
C36	34.00	38.00	35	90	30.4	33.0	37.4	80	350
C39	37.00	41.00	40	130	33.4	36.4	41.2	80	350
C43	40.00	46.00	45	150	37.6	41.2	46.6	85	375
C47	44.00	50.00	50	170	42.0	46.1	51.8	85	375
C51	48.00	54.00	60	180	46.6	51.0	57.2	90	400
C56	52.00	60.00	70	200	52.2	57.0	63.8	100	425
C62	58.00	66.00	80	215	58.8	64.4	71.6	120	450
C68	64.00	72.00	90	240	65.6	71.7	79.8	150	475
C75	70.00	79.00	95	255	73.4	80.02	88.6	170	500

± 2% tolerance range

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/K) at I_{Ztest} = 5 mA			differential resistance r_{diff} (Ω) at I_Z = 1 mA	
	min.	max.	typ.	max.	min.	typ.	max.	typ.	max.
B2V4	2.35	2.45	70	100	−3.5	−1.6	0	275	600
B2V7	2.65	2.75	75	100	−3.5	−2.0	0	300	600
B3V0	2.94	3.06	80	95	−3.5	−2.1	0	325	600
B3V3	3.23	3.37	85	95	−3.5	−2.4	0	350	600
B3V6	3.53	3.67	85	90	−3.5	−2.4	0	375	600
B3V9	3.82	3.98	85	90	−3.5	−2.5	0	400	600
B4V3	4.21	4.39	80	90	−3.5	−2.5	0	410	600
B4V7	4.61	4.79	50	80	−3.5	−1.4	0.2	425	500
B5V1	5.00	5.20	40	60	−2.7	−0.8	1.2	400	480
B5V6	5.49	5.71	15	40	−2.0	1.2	2.5	80	400
B6V2	6.08	6.32	6	10	0.4	2.3	3.7	40	150
B6V8	6.66	6.94	6	15	1.2	3.0	4.5	30	80
B7V5	7.35	7.65	6	15	2.5	4.0	5.3	30	80
B8V2	8.04	8.36	6	15	3.2	4.6	6.2	40	80
B9V1	8.92	9.28	6	15	3.8	5.5	7.0	40	100
B10	9.80	10.20	8	20	4.5	6.4	8.0	50	150
B11	10.80	11.20	10	20	5.4	7.4	9.0	50	150
B12	11.80	12.20	10	25	6.0	8.4	10.0	50	150
B13	12.70	13.30	10	30	7.0	9.4	11.0	50	170
B15	14.70	15.30	10	30	9.2	11.4	13.0	50	200
B16	15.70	16.30	10	40	10.4	12.4	14.0	50	200
B18	17.60	18.40	10	45	12.4	14.4	16.0	50	225
B20	19.60	20.40	15	55	14.4	16.4	18.0	60	225
B22	21.60	22.40	20	55	16.4	18.4	20.0	60	250
B24	23.50	24.50	25	70	18.4	20.4	22.0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0.5 mA	
B27	26.50	27.50	25	80	21.4	23.4	25.3	65	300
B30	29.40	30.60	30	80	24.4	26.6	29.4	70	300
B33	32.30	33.70	35	80	27.4	29.7	33.4	75	325
B36	35.30	36.70	35	90	30.4	33.0	37.4	80	350
B39	38.20	39.80	40	130	33.4	36.4	41.2	80	350
B43	42.10	43.90	45	150	37.6	41.2	46.6	85	375
B47	46.10	47.90	50	170	42.0	46.1	51.8	85	375
B51	50.00	52.00	60	180	46.6	51.0	57.2	90	400
B56	54.90	57.10	70	200	52.2	57.0	63.8	100	425
B62	60.80	63.20	80	215	58.8	64.4	71.6	120	450
B68	66.60	69.40	90	240	65.6	71.7	79.8	150	475
B75	73.50	76.50	95	255	73.4	80.02	88.6	170	500

T_j = 25 °C
± 1% tolerance range

BZX84	working voltage V_Z (V) at I_{Ztest} = 5 mA min.	max.	differential resistance r_{diff} (Ω) at I_{Ztest} = 5 mA typ.	max.	temperature coefficient S_Z (mV/K) at I_{Ztest} = 5 mA min.	typ.	max.	differential resistance r_{diff} (Ω) at I_Z = 1 mA typ.	max.
A2V4	2.37	2.43	70	100	−3.5	−1.6	0	275	600
A2V7	2.67	2.73	75	100	−3.5	−2.0	0	300	600
A3V0	2.97	3.03	80	95	−3.5	−2.1	0	325	600
A3V3	3.26	3.34	85	95	−3.5	−2.4	0	350	600
A3V6	3.56	3.64	85	90	−3.5	−2.4	0	375	600
A3V9	3.86	3.94	85	90	−3.5	−2.5	0	400	600
A4V3	4.25	4.35	80	90	−3.5	−2.5	0	410	600
A4V7	4.65	4.75	50	80	−3.5	−1.4	0.2	425	500
A5V1	5.04	5.16	40	60	−2.7	−0.8	1.2	400	480
A5V6	5.54	5.66	15	40	−2.0	1.2	2.5	80	400
A6V2	6.13	6.27	6	10	0.4	2.3	3.7	40	150
A6V8	6.73	6.87	6	15	1.2	3.0	4.5	30	80
A7V5	7.42	7.58	6	15	2.5	4.0	5.3	30	80
A8V2	8.11	8.29	6	15	3.2	4.6	6.2	40	80
A9V1	9.0	9.2	6	15	3.8	5.5	7.0	40	100
A10	9.9	10.10	8	20	4.5	6.4	8.0	50	150
A11	10.8	11.11	10	20	5.4	7.4	9.0	50	150
A12	11.88	12.12	10	25	6.0	8.4	10.0	50	150
A13	12.87	13.13	10	30	7.0	9.4	11.0	50	170
A15	14.85	15.15	10	30	9.2	11.4	13.0	50	200
A16	15.84	16.16	10	40	10.4	12.4	14.0	50	200
A18	17.82	18.18	10	45	12.4	14.4	16.0	50	225
A20	19.80	20.20	15	55	14.4	16.4	18.0	60	225
A22	21.78	22.22	20	55	16.4	18.4	20.0	60	250
A24	23.76	24.24	25	70	18.4	20.4	22.0	60	250
	at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA		at I_{Ztest} = 2 mA			at I_Z = 0.5 mA	
A27	26.73	27.27	25	80	21.4	23.4	25.3	65	300
A30	29.70	30.30	30	80	24.4	26.6	29.4	70	300
A33	32.67	33.33	35	80	27.4	29.7	33.4	75	325
A36	35.64	36.36	35	90	30.4	33.0	37.4	80	350
A39	38.61	39.39	40	130	33.4	36.4	41.2	80	350
A43	42.57	43.43	45	150	37.6	41.2	46.6	85	375
A47	46.53	47.47	50	170	42.0	46.1	51.8	85	375
A51	50.49	51.51	60	180	46.6	51.0	57.2	90	400
A56	55.44	56.56	70	200	52.2	57.0	63.8	100	425
A62	61.38	62.62	80	215	58.8	64.4	71.6	120	450
A68	67.32	68.68	90	240	65.6	71.7	79.8	150	475
A75	74.25	75.75	95	255	73.4	80.02	88.6	170	500

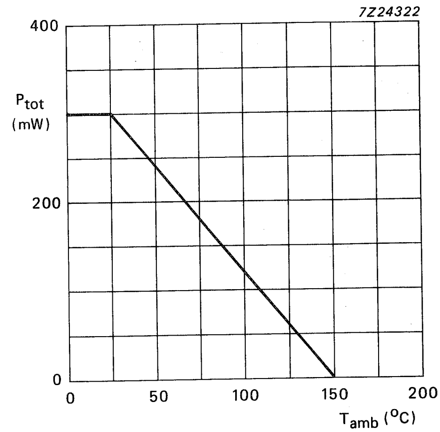


Fig. 2 Power derating curve.

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 8 x 10 x 0.7 mm; at I_Z = 7 mA.

$$V_{Z\ stat} = 24 + \left(\frac{7}{1000} \times 24 \times \frac{430}{1000} \times 20.4\right)$$

$$= 24 + 1.47 = 25.47\ \text{V}.$$

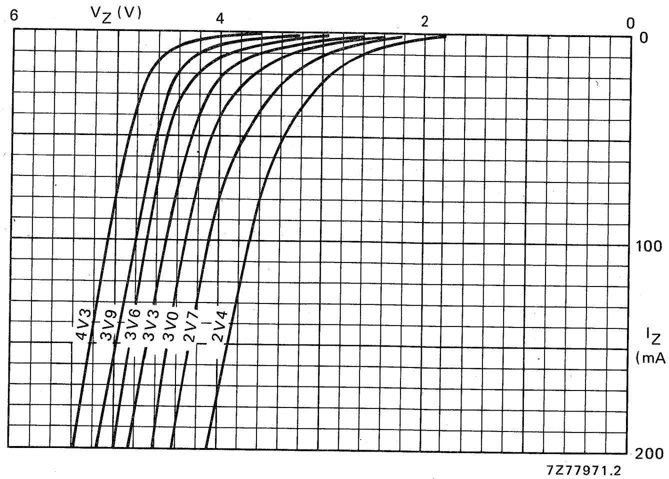


Fig. 3 Dynamic characteristics; typical values; T_j = 25 °C.

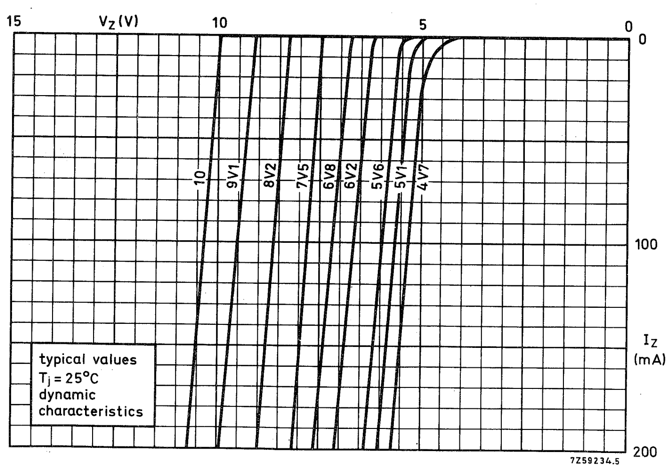


Fig. 4 Dynamic characteristics; typical values; T_j = 25 °C.

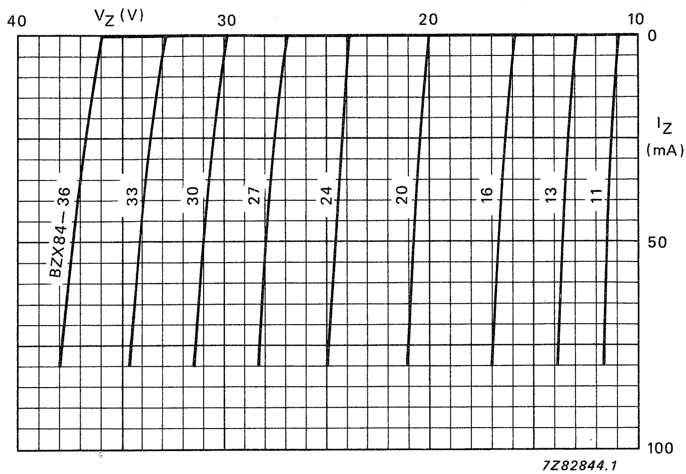


Fig. 5 Dynamic characteristics; typical values; T_j = 25 °C.

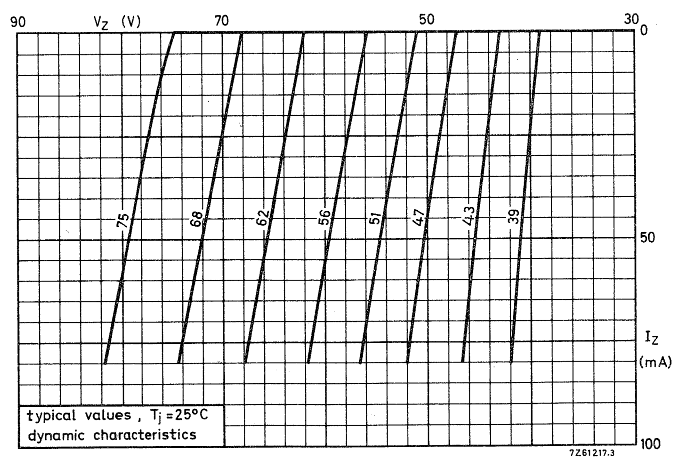


Fig. 6 Dynamic characteristics; typical values; T_j = 25 °C.

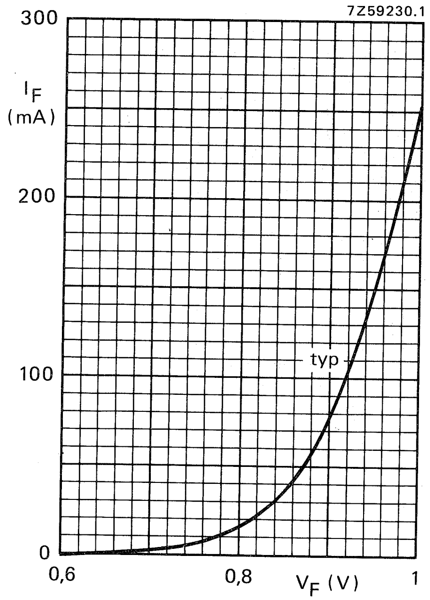


Fig. 7 Typical values at T_j = 25 °C.

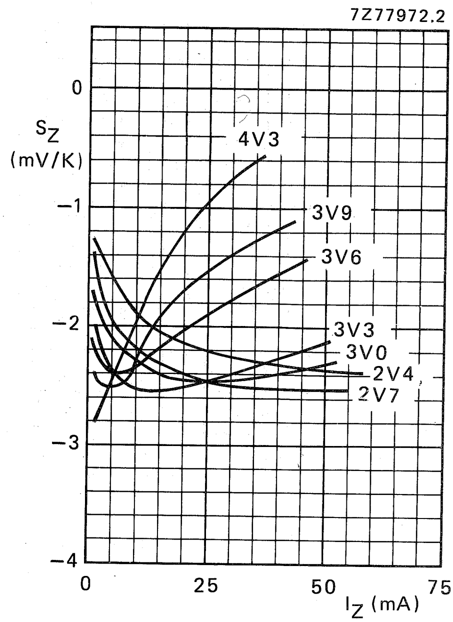


Fig. 8 Typical values; T_j = 25 to 175 °C.

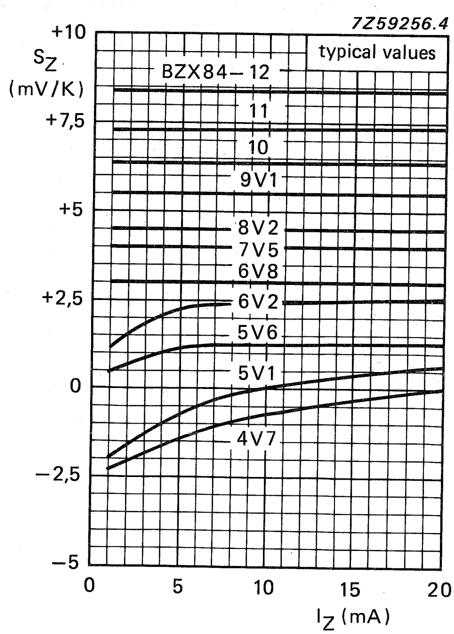


Fig. 9 Typical values; T_j = 25 to 175 °C.

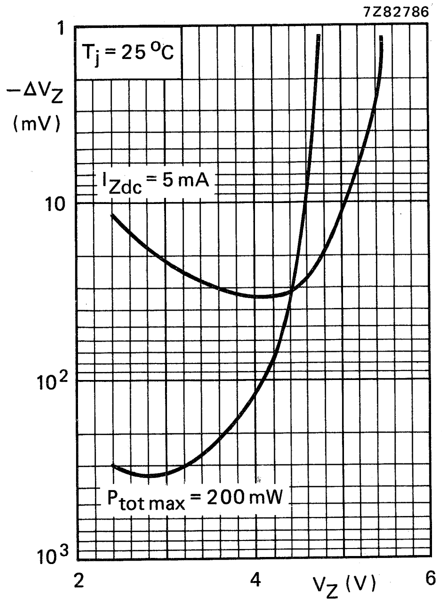


Fig. 10 Typical values; $T_j = 25\ ^oC$.

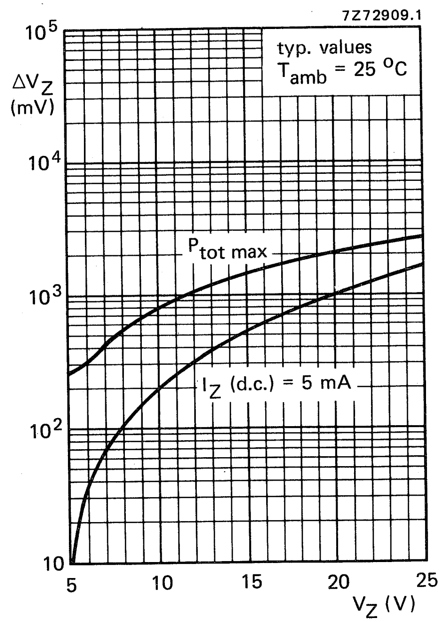


Fig. 11 Typical values; $T_{amb} = 25\ ^oC$.

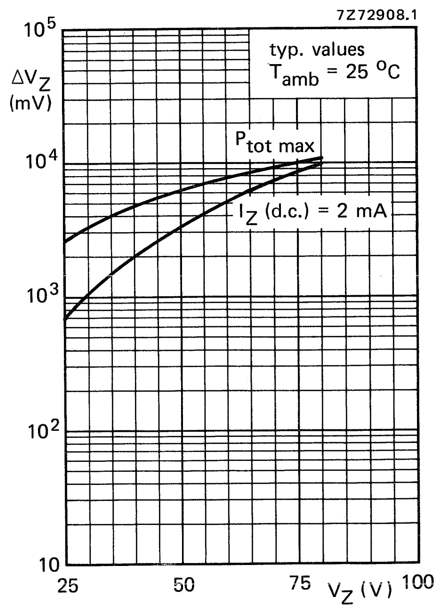


Fig. 12 Typical values; $T_{amb} = 25\ ^oC$.

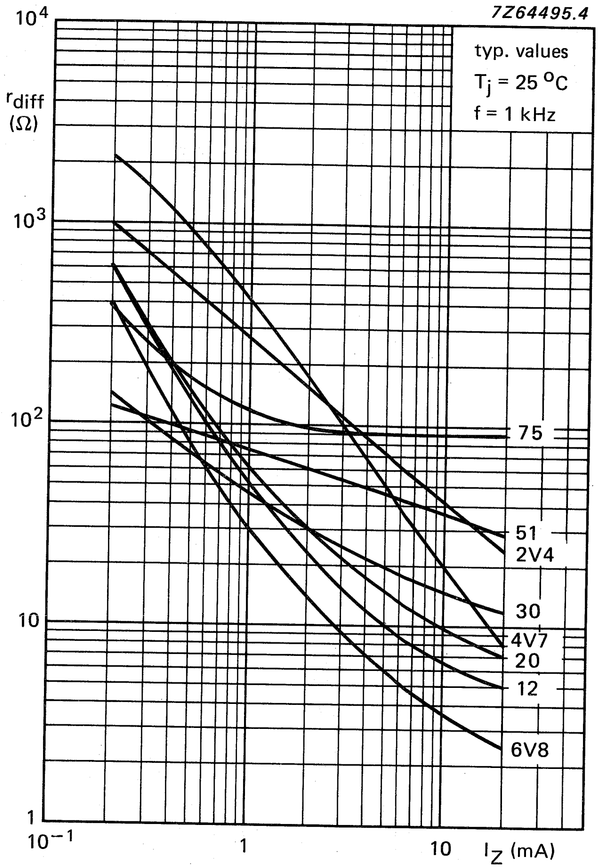

7Z64495.4
typ. values
T_j = 25 °C
f = 1 kHz
r_{diff} (Ω)
10^4
10^3
10^2
10
1
10^{-1}
1
10
I_Z (mA)
75
51
2V4
30
4V7
20
12
6V8

Fig. 13.

Low voltage avalanche diode

PLVA400A

FEATURES

- Very low dynamic impedance at low currents: approximately 1⁄20 of conventional series
- Hard breakdown knee
- Low noise: approximately 1⁄10 of conventional series.

DESCRIPTION

The PLVA400A series are silicon planar high performance voltage regulators, with a hard breakdown knee, low noise and very low dynamic impedance.

They are intended for low current, low power and low noise applications, such as CMOS RAM back-up circuits, voltage stabilizers, voltage limiters and smoke detector relays.

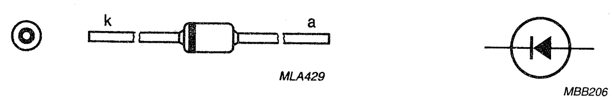
The devices are encapsulated in a DO-35 envelope.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_Z	nominal working voltage range		5	6.8	V
P_{tot}	total power dissipation	note 1	–	400	mW
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; T_j = 150 °C	–	30	W
T_j	junction temperature		–	175	°C

Note

1. Providing leads are kept at T_{tp} = 55 °C at 8 mm from body.



Marking code:

PLVA450A: 450A PH
PLVA453A: 453A PH
PLVA456A: 456A PH
PLVA459A: 459A PH
PLVA462A: 462A PH
PLVA465A: 465A PH
PLVA468A: 468A PH.

Fig.1 Simplified outline (DO-35) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_Z	working current	DC	–	note 1	mA
I_{FRM}	repetitive peak forward current	t_p = 100 µs; δ = 10%	–	250	mA
I_{ZRM}	repetitive peak working current	t_p = 100 µs; δ = 10%	–	250	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; δ = 10%	–	30	W
P_{tot}	total power dissipation	up to T_{tp} = 55 °C at 8 mm from body	–	400	mW
T_{stg}	storage temperature range		−65	200	°C
T_j	junction temperature		–	175	°C

Note

1. The DC working current (I_Z) is limited by $P_{tot\ max}$.

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tie-point	tie-point at 8 mm from body	300 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	at maximum lead length	380 K/W

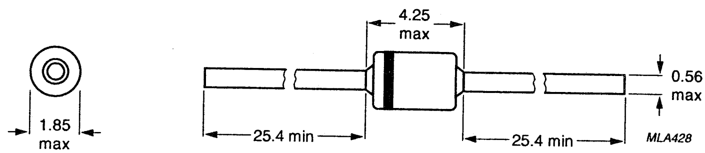
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 10 mA	–	–	900	mV
V_Z	working voltage	I_Z = 250 μA				
	PLVA450A		4.8	5.0	5.2	V
	PLVA453A		5.1	5.3	5.5	V
	PLVA456A		5.4	5.6	5.8	V
	PLVA459A		5.7	5.9	6.1	V
	PLVA462A		6	6.2	6.4	V
	PLVA465A		6.3	6.5	6.7	V
	PLVA468A		6.6	6.8	7.0	V
		I_Z = 10 μA				
	PLVA450A		–	4.30	–	V
	PLVA453A		–	5.20	–	V
	PLVA456A		–	5.51	–	V
	PLVA459A		–	5.85	–	V
	PLVA462A		–	6.19	–	V
	PLVA465A		–	6.49	–	V
	PLVA468A		–	6.80	–	V
R_z	dynamic resistance	1 kHz superimposed; I_{ZAC} is 10% of I_{ZDC}; I_Z = 250 μA				
	PLVA450A		–	–	700	Ω
	PLVA453A		–	–	250	Ω
	PLVA456A to 468A		–	–	100	Ω
S_z	temperature coefficient	I_Z = 250 μA				
	PLVA450A		–	0.2	–	mV/K
	PLVA453A		–	1.6	–	mV/K
	PLVA456A		–	1.9	–	mV/K
	PLVA459A		–	2.4	–	mV/K
	PLVA462A		–	2.65	–	mV/K
	PLVA465A		–	2.9	–	mV/K
	PLVA468A		–	3.4	–	mV/K

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_R	reverse current	V_R = 80% V_Z nominal				
	PLVA450A		–	–	10 000	nA
	PLVA453A		–	–	5000	nA
	PLVA456A		–	–	1000	nA
	PLVA459A		–	–	500	nA
	PLVA462A		–	–	100	nA
	PLVA465A		–	–	50	nA
	PLVA468A		–	–	10	nA
		V_R = 50% V_Z nominal				
	PLVA450A		–	34	–	nA
	PLVA453A		–	22	–	nA
	PLVA456A		–	1.1	–	nA
	PLVA459A		–	0.9	–	nA
	PLVA462A		–	0.9	–	nA
	PLVA465A		–	0.9	–	nA
	PLVA468A		–	0.8	–	nA
		V_R = 90% V_Z nominal				
	PLVA450A		–	21	–	μA
	PLVA453A		–	3.5	–	μA
	PLVA456A		–	1.3	–	μA
	PLVA459A		–	1.0	–	μA
	PLVA462A		–	0.05	–	μA
	PLVA465A		–	0.04	–	μA
	PLVA468A		–	0.006	–	μA
ΔV_Z	line regulation PLVA459A to 468A	I_{LO} = 10 μA; I_{HI} = 1 mA	–	–	0.1	V
	PLVA456A	I_{LO} = 50 μA; I_{HI} = 1 mA	–	–	0.1	V
	PLVA450A	I_{LO} = 100 μA; I_{HI} = 1 mA	–	–	0.4	V
	PLVA453A		–	–	0.2	V
V_n	noise voltage density	f = 1 kHz; B = 1 kHz; I_Z = 250 μA	–	–	1.0	μV/√Hz

PACKAGE OUTLINE



Dimensions in mm.

Fig.2 DO-35.

Low voltage avalanche diode

PLVA600A

FEATURES

- Very low dynamic impedance at low currents
- Hard breakdown knee
- Low noise level.

DESCRIPTION

The PLVA600A series are silicon planar high performance voltage regulators, with a hard breakdown knee, low noise and very low dynamic impedance.

They are intended for low current, low power and low noise applications, such as CMOS RAM back-up circuits, voltage stabilizers, voltage limiters and smoke detector relays.

The devices are encapsulated in a SOT23 microminiature plastic envelope.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_Z	nominal working voltage range		5	6.8	V
P_{tot}	total power dissipation	up to T_{amb} = 25 °C	–	250	mW
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; T_j = 150 °C	–	30	W
T_j	junction temperature		–	150	°C

Marking code:

PLVA650A: p9A
PLVA653A: p9B
PLVA656A: p9C
PLVA659A: p9D
PLVA662A: p9E
PLVA665A: p9F
PLVA668A: p9G.

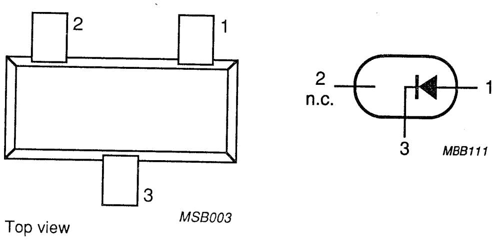


Fig.1 Simplified outline (SOT23) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
I_Z	working current	DC	–	note 1	mA
I_{FRM}	repetitive peak forward current	t_p = 100 µs; δ = 10%	–	250	mA
I_{ZRM}	repetitive peak working current	t_p = 100 µs; δ = 10%	–	250	mA
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; T_j = 150 °C	–	30	W
P_{tot}	total power dissipation	up to T_{amb} = 25 °C; note 2	–	250	mW
T_{stg}	storage temperature range		–65	150	°C
T_j	junction temperature		–	150	°C

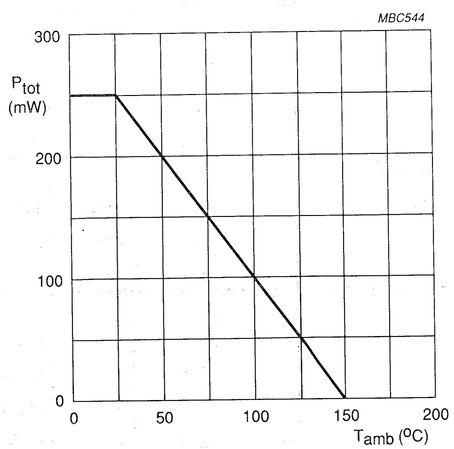


Fig.2 Power derating curve.

THERMAL RESISTANCE

SYMBOL	PARAMETER	THERMAL RESISTANCE
$R_{th\ j\text{-}a}$	from junction to ambient (note 2)	500 K/W

Notes

1. The DC working current (I_Z) is limited by $P_{tot\ max}$.
2. Device mounted on FR4 printboard.

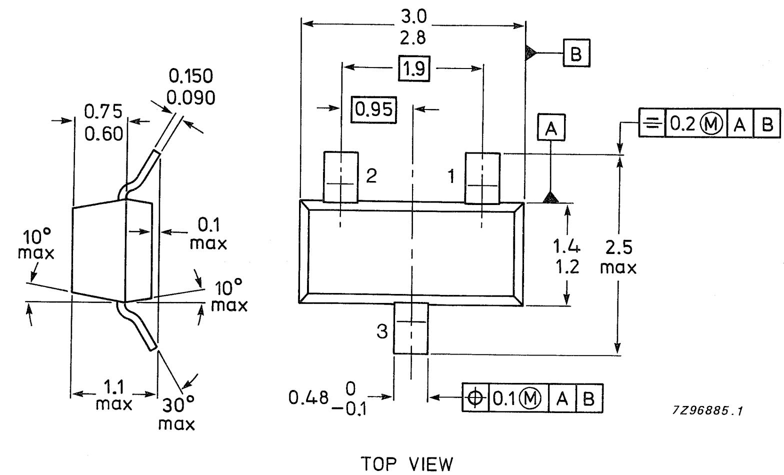
CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 10 mA	–	–	900	mV
V_Z	working voltage	I_Z = 250 μA				
	PLVA650A		4.8	5.0	5.2	V
	PLVA653A		5.1	5.3	5.5	V
	PLVA656A		5.4	5.6	5.8	V
	PLVA659A		5.7	5.9	6.1	V
	PLVA662A		6	6.2	6.4	V
	PLVA665A		6.3	6.5	6.7	V
	PLVA668A		6.6	6.8	7.0	V
		I_Z = 10 μA				
	PLVA650A		–	4.30	–	V
	PLVA653A		–	5.20	–	V
	PLVA656A		–	5.51	–	V
	PLVA659A		–	5.85	–	V
	PLVA662A		–	6.19	–	V
	PLVA665A		–	6.49	–	V
	PLVA668A		–	6.80	–	V
R_z	dynamic resistance	1 kHz superimposed; I_{ZAC} is 10% of I_{ZDC}; I_Z = 250 μA				
	PLVA650A		–	–	700	Ω
	PLVA653A		–	–	250	Ω
	PLVA656A to 668A		–	–	100	Ω
S_z	temperature coefficient	I_Z = 250 μA				
	PLVA650A		–	0.2	–	mV/K
	PLVA653A		–	1.6	–	mV/K
	PLVA656A		–	1.9	–	mV/K
	PLVA659A		–	2.4	–	mV/K
	PLVA662A		–	2.65	–	mV/K
	PLVA665A		–	2.9	–	mV/K
	PLVA668A		–	3.4	–	mV/K

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
I_R	reverse current	V_R = 80% V_Z nominal				
	PLVA650A		–	–	10 000	nA
	PLVA653A		–	–	5000	nA
	PLVA656A		–	–	1000	nA
	PLVA659A		–	–	500	nA
	PLVA662A		–	–	100	nA
	PLVA665A		–	–	50	nA
	PLVA668A		–	–	10	nA
		V_R = 50% V_Z nominal				
	PLVA650A		–	34	–	nA
	PLVA653A		–	22	–	nA
	PLVA656A		–	1.1	–	nA
	PLVA659A		–	0.9	–	nA
	PLVA662A		–	0.9	–	nA
	PLVA665A		–	0.8	–	nA
	PLVA668A		–	0.8	–	nA
		V_R = 90% V_Z nominal				
	PLVA650A		–	21	–	μA
	PLVA653A		–	3.5	–	μA
	PLVA656A		–	1.3	–	μA
	PLVA659A		–	1.0	–	μA
	PLVA662A		–	0.05	–	μA
	PLVA665A		–	0.04	–	μA
	PLVA668A		–	0.006	–	μA
ΔV_Z	line regulation PLVA659A to 668A	I_{LO} = 10 μA; I_{HI} = 1 mA	–	–	0.1	V
	PLVA656A	I_{LO} = 50 μA; I_{HI} = 1 mA	–	–	0.1	V
	PLVA650A	I_{LO} = 100 μA; I_{HI} = 1 mA	–	–	0.4	V
	PLVA653A		–	–	0.2	V
V_n	noise voltage density	f = 1 kHz; B = 1 kHz; I_Z = 250 μA	–	–	1.0	μV/√Hz

PACKAGE OUTLINE



Dimensions in mm.

Fig.3 SOT23.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

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

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	70	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
Forward voltage at I_F = 10 mA	V_F	max.	1	V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	max.	4	ns

MECHANICAL DATA

Dimensions in mm

Marking code:
PMBD914: p5D

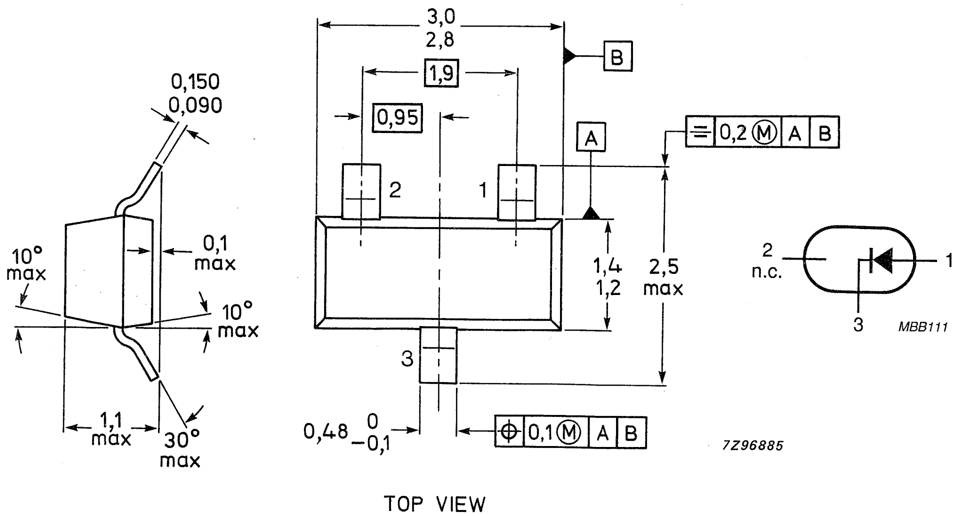


Fig. 1 SOT-23.

RATINGS

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.	100	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipated 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

T_{amb} = 25 °C unless otherwise specified

Forward voltage I_F = 10 mA	V_F	max.	1.0	V
Reverse breakdown voltage I_R = 100 μA	$V_{(BR)R}$	min.	100	V
Reverse current V_R = 25 V	I_R	max.	25	nA
V_R = 75 V	I_R	max.	5	μA
Diode capacitance V_R = 0 V; f = 1 MHz	C_d	max.	4.0	pF
Reverse recovery time switched from I_F = 10 mA to I_R = 10 mA; measured at I_R = 1 mA (see Fig. 2)	t_{rr}	max.	4	ns

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

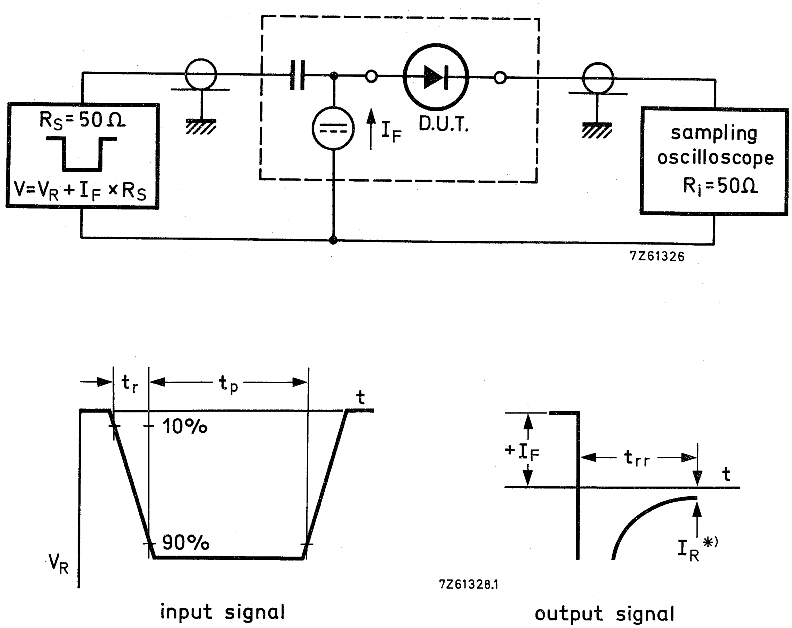


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

The PMBD2835 and 2836 consist of two diodes in a microminiature plastic envelope. The anodes are commoned and the unit is intended for high speed switching.

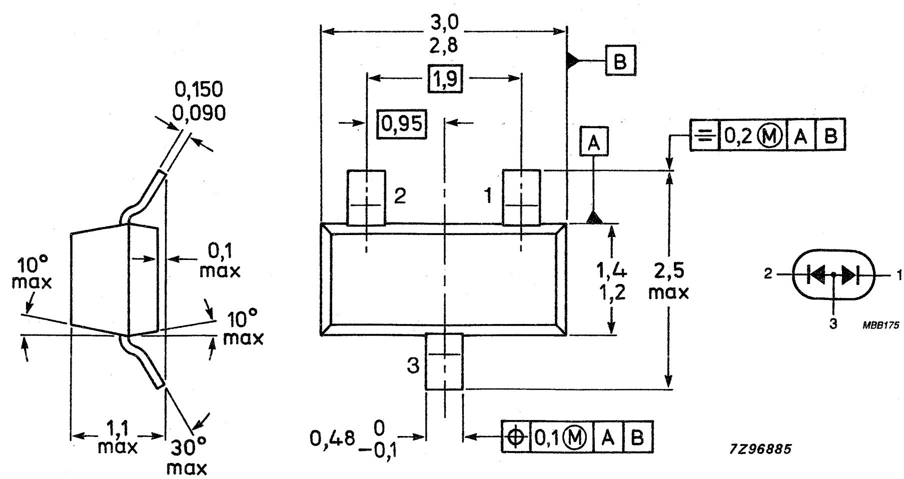
QUICK REFERENCE DATA (per diode)

			PMBD2835	PMBD2836	
Continuous reverse voltage	V_R	max.	35	75	V
Forward current (DC)	I_F	max.	100		mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300		mW
Junction temperature	T_j	max.	150		°C
Forward voltage at I_F = 50 mA	V_F	<	1.0		V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	<	6		ns

MECHANICAL DATA

Dimensions in mm

Marking code:
PMBD2835: pA3
PMBD2836: pA2



TOP VIEW

Fig. 1 SOT-23.

See also soldering recommendations.

RATINGS (per diode)

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

			PMBD2835	PMBD2836	
Continuous reverse voltage	V_R	max.	35	75	V
Forward current (DC)	I_F	max.	100		mA
Total power dissipated 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_{amb} = 25 °C unless otherwise specified

Forward voltage					
I_F = 50 mA		V_F	<	1.0	V
I_F = 100 mA		V_F	<	1.2	V
Reverse breakdown voltage					
I_R = 100 μA	PMBD2835	$V_{(BR)R}$	>	35	V
	PMBD2836	$V_{(BR)R}$	>	75	V
Reverse current					
V_R = 30 V	PMBD2835	I_R	<	100	nA
V_R = 50 V	PMBD2836	I_R	<	100	nA
Diode capacitance					
V_R = 0 V; f = 1 MHz		C_d	<	4.0	pF
Reverse recovery time switched from I_F = 10 mA to I_R = 10 mA; measured at I_R = 1 mA (see Fig. 2)		t_{rr}	<	6	ns

* See Thermal Resistance.

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

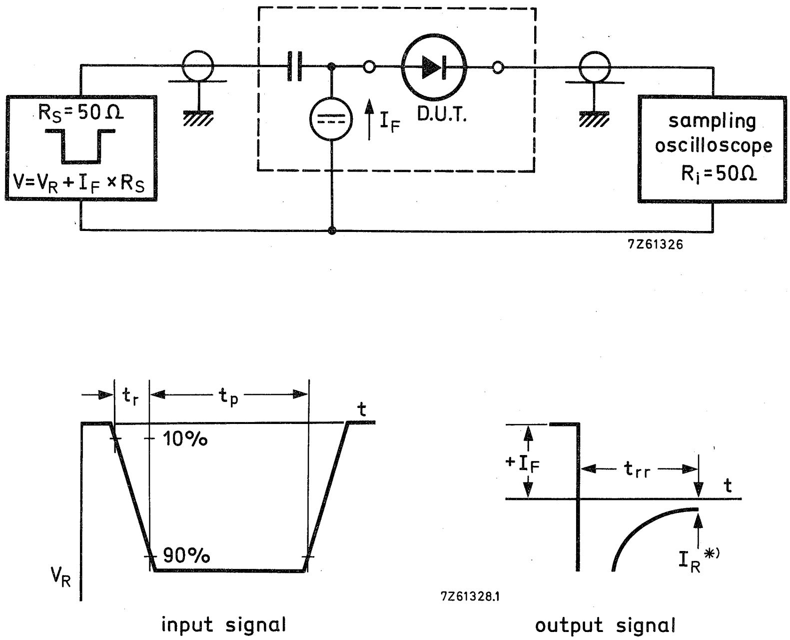


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

The PMBD2837 and 2838 consist of two diodes in a microminiature plastic envelope. The cathodes are commoned and the unit is intended for high speed switching.

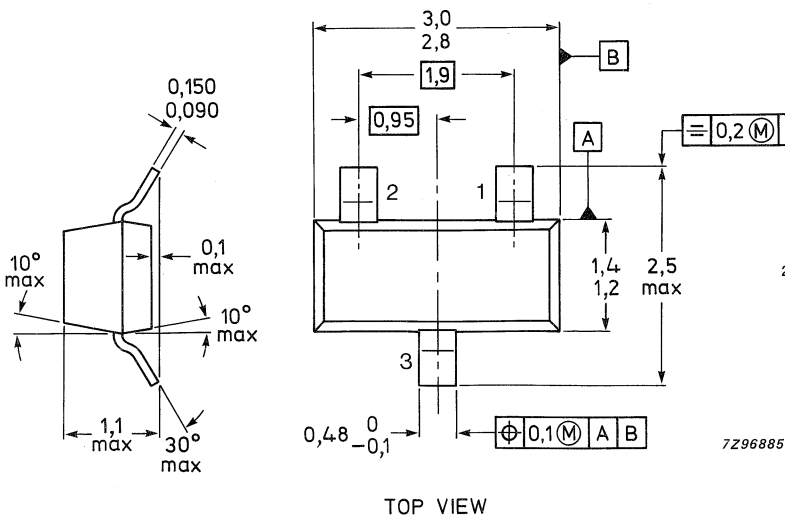
QUICK REFERENCE DATA (per diode)

			PMBD2837	PMBD2838	
Continuous reverse voltage	V_R	max.	30	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	35	75	V
Repetitive peak forward current	I_{FRM}	max.	450		mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300		mW
Junction temperature	T_j	max.	150		°C
Forward voltage at I_F = 50 mA	V_F	<	1.0		V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	<	6		ns

MECHANICAL DATA

Dimensions in mm

Marking code:
PMBD2837: pA5
PMBD2838: pA6



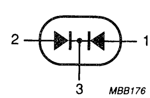


Fig. 1 SOT-23.

See also soldering recommendations.

RATINGS (per diode)

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

			PMBD2837	PMBD2838	
Continuous reverse voltage	V_R	max.	30	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	35	75	V
Average rectified forward current	$I_{F(AV)}$	max.	150		mA
Repetitive peak forward current	I_{FRM}	max.	450		mA
Total power dissipated 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_{amb} = 25 °C unless otherwise specified

Forward voltage					
I_F = 50 mA		V_F	<	1.0	V
I_F = 100 mA		V_F	<	1.2	V
Reverse breakdown voltage					
I_R = 100 μA	PMBD2837	$V_{(BR)R}$	>	35	V
	PMBD2838	$V_{(BR)R}$	>	75	V
Reverse current					
V_R = 30 V	PMBD2837	I_R	<	100	nA
V_R = 50 V	PMBD2838	I_R	<	100	nA
Diode capacitance					
V_R = 0 V; f = 1 MHz		C_d	<	4.0	pF
Reverse recovery time switched from I_F = 10 mA to I_R = 10 mA; measured at I_R = 1 mA (see Fig. 2)		t_{rr}	<	6	ns

* See Thermal Resistance.

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

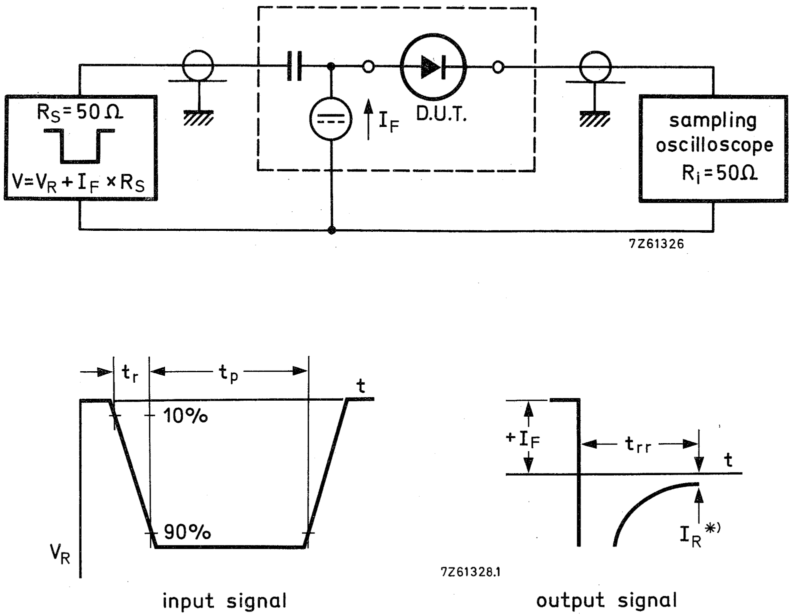


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

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

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	70	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
Forward voltage at I_F = 100 mA	V_F	min.	0.85	V
		max.	1.1	V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	max.	4	ns

MECHANICAL DATA

Dimensions in mm

Marking code:
PMBD6050: p5A

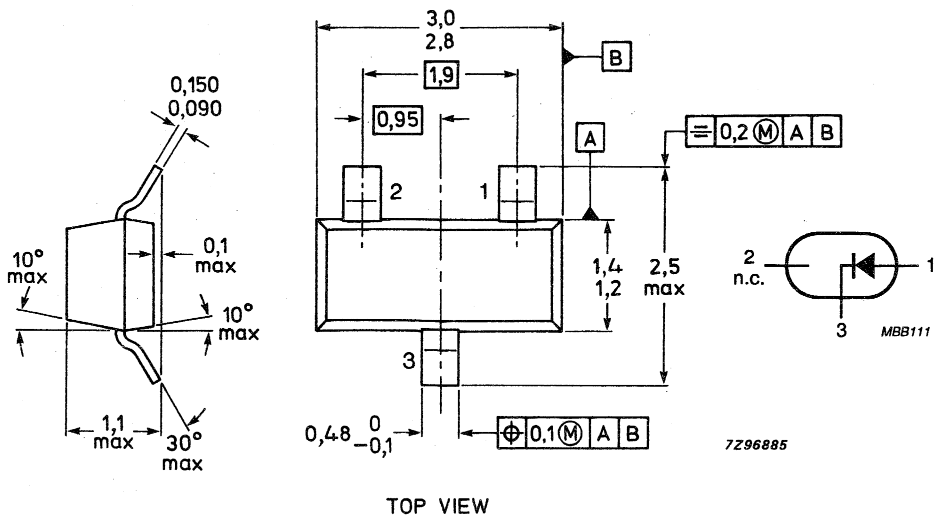


Fig. 1 SOT-23.

RATINGS

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

Continuous reverse voltage	V_R	max.	70	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipated 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

T_{amb} = 25 °C unless otherwise specified

Forward voltage				
I_F = 1 mA	V_F	min.	0.55	V
		max.	0.70	V
I_F = 100 mA	V_F	min.	0.85	V
		max.	1.10	V
Reverse breakdown voltage I_R = 100 μA	$V_{(BR)R}$	min.	70	V
Reverse current V_R = 50 V	I_R	max.	100	nA
Diode capacitance V_R = 0 V; f = 1 MHz	C_d	max.	2.5	pF
Reverse recovery time switched from I_F = 10 mA to I_R = 10 mA; measured at I_R = 1 mA (see Fig. 2)	t_{rr}	max.	4	ns

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

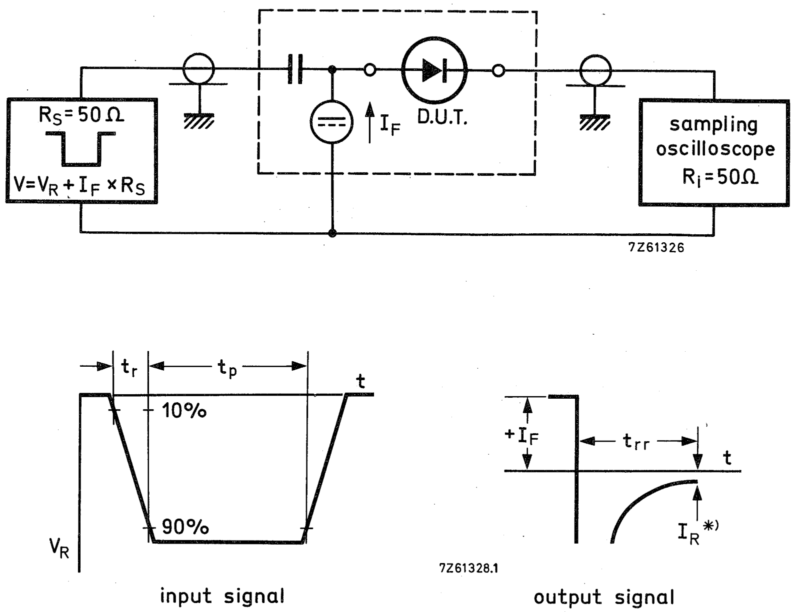


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

The PMBD6100 consists of two diodes in a microminiature plastic envelope. The cathodes are commoned and the unit is intended for high speed switching.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	70	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C
Forward voltage at I_F = 100 mA	V_F	>	0.85	V
		<	1.1	V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	<	6	ns

MECHANICAL DATA

Dimenions in mm

Marking code:
PMBD6100: p5B

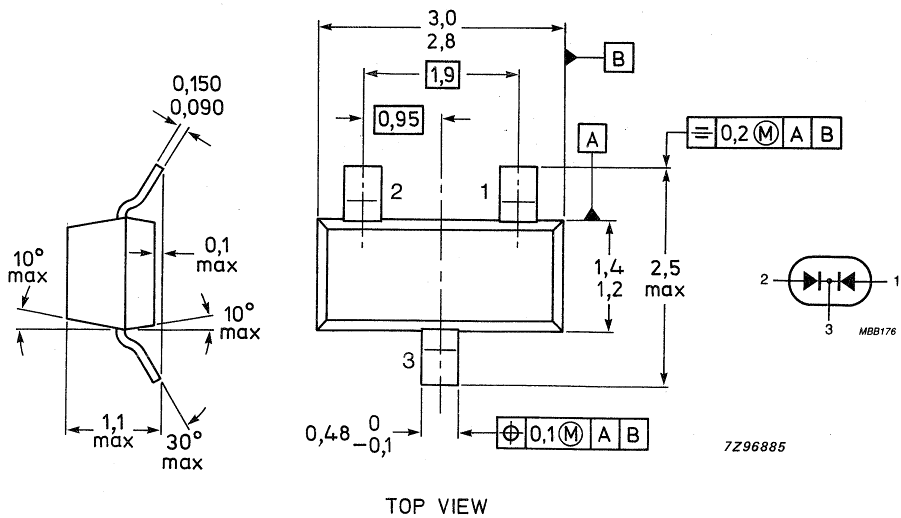


Fig. 1 SOT-23.

See also soldering recommendations.

RATINGS

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

Continuous reverse voltage	V_R	max.	70	V
Forward current (DC)	I_F	max.	200	mA
Non-repetitive peak forward current	I_{FSM}	max.	500	mA
Total power dissipated up to $T_{amb} = 25\ ^oC$	P_{tot}	max.	300	mW
Storage temperature	T_{stg}	–65 to + 150		^oC
Junction temperature	T_j	max.	150	^oC

THERMAL RESISTANCE*

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

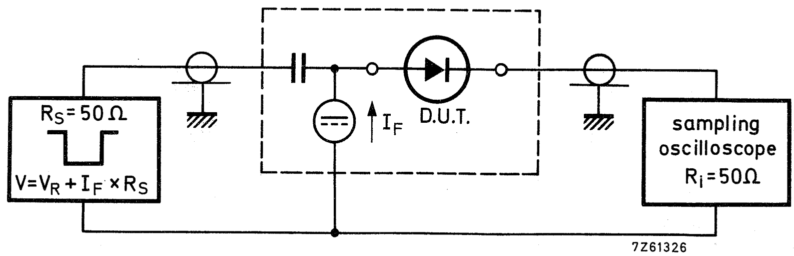
CHARACTERISTICS (per diode)

$T_{amb} = 25\ ^oC$ unless otherwise specified

Forward voltage				
$I_F = 1$ mA	V_F	>	0.55	V
		<	0.70	V
$I_F = 100$ mA	V_F	>	0.85	V
		<	1.10	V
Reverse breakdown voltage $I_R = 100\ \mu A$	$V_{(BR)R}$	>	70	V
Reverse current $V_R = 50$ V	I_R	<	100	nA
Diode capacitance $V_R = 0$ V; f = 1 MHz	C_d	<	2.5	pF
Reverse recovery time switched from $I_F = 10$ mA to $I_R = 10$ mA; measured at $I_R = 1$ mA (see Fig. 2)	t_{rr}	<	6	ns

* See Thermal Resistance

** Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.



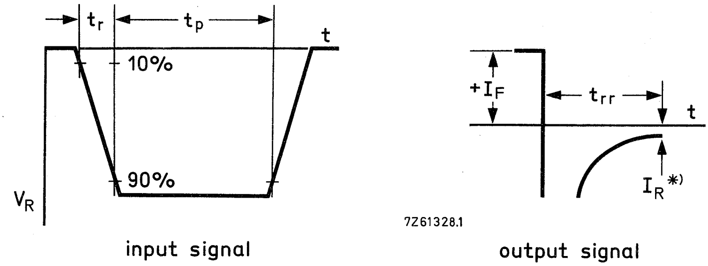


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR EPITAXIAL HIGH SPEED DIODES

The PMBD7000 consists of two diodes in a microminiature plastic envelope. The diodes are connected in series and the unit is intended for high speed switching.

QUICK REFERENCE DATA

Continuous reverse voltage	V_R	max.	100 V
Forward current (DC)	I_F	max.	200 mA
Non-repetitive peak forward current	I_{FSM}	max.	500 mA
Total power dissipation at T_{amb} = 25 °C	P_{tot}	max.	300 mW
Junction temperature	T_j	max.	150 °C
Forward voltage at I_F = 100 mA	V_F	max.	1.10 V
Reverse recovery time I_F = 10 mA to I_R = 10 mA measured at I_R = 1 mA	t_{rr}	max.	4 ns

MECHANICAL DATA

Dimensions in mm

Marking code:
PMBD7000: p5C

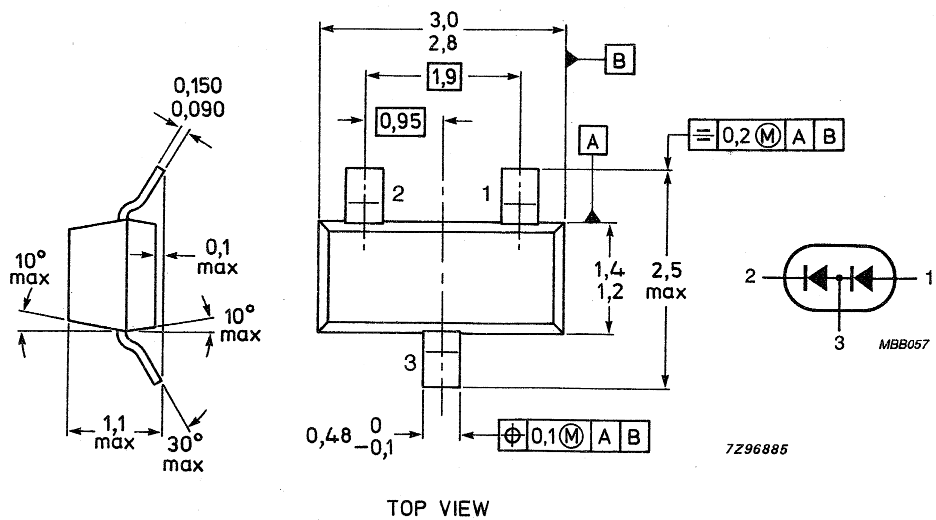


Fig. 1 SOT-23.

RATINGS

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

Continuous reverse voltage	V_R	max.	100 V
Forward current (DC)	I_F	max.	200 mA
Non-repetitive peak forward current	I_{FSM}	max.	500 mA
Total power dissipated 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_{amb} = 25 °C unless otherwise specified

Forward voltage			
I_F = 1 mA	V_F	min.	0.55 V
		max.	0.70 V
I_F = 10 mA	V_F	min.	0.67 V
		max.	0.82 V
I_F = 100 mA	V_F	min.	0.75 V
		max.	1.10 V
Reverse breakdown voltage			
I_R = 100 μA	$V_{(BR)R}$	min.	100 V
Reverse current			
V_R = 50 V	I_R	max.	300 nA
V_R = 100 V	I_R	max.	500 nA
V_R = 50 V; T_{amb} = 125 °C	I_R	max.	100 μA
Diode capacitance			
V_R = 0 V; f = 1 MHz	C_d	max.	1.5 pF
Reverse recovery time switched from I_F = 10 mA to I_R = 10 mA; measured at I_R = 1 mA (see Fig. 2)	t_{rr}	max.	4 ns

* Mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

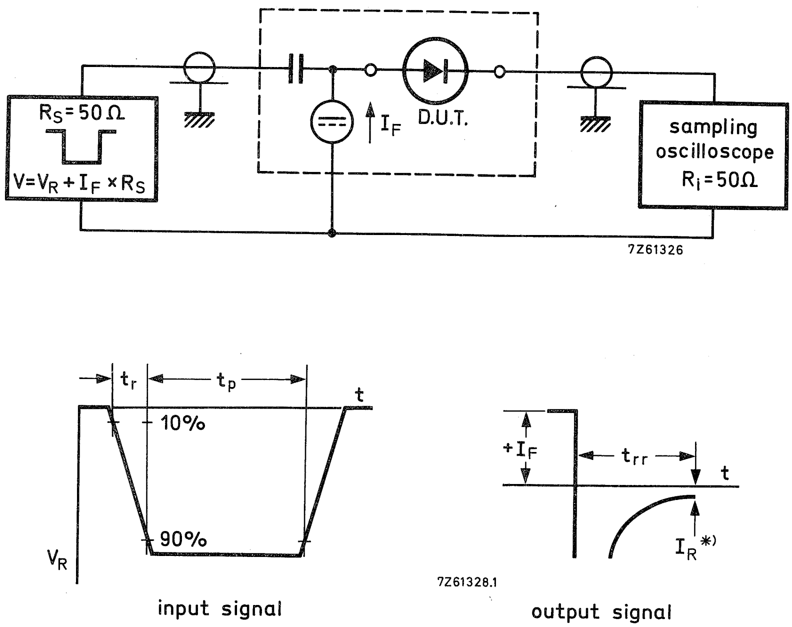


Fig. 2 Test circuit and waveforms; reverse recovery time.

SILICON PLANAR VOLTAGE REGULATOR DIODES

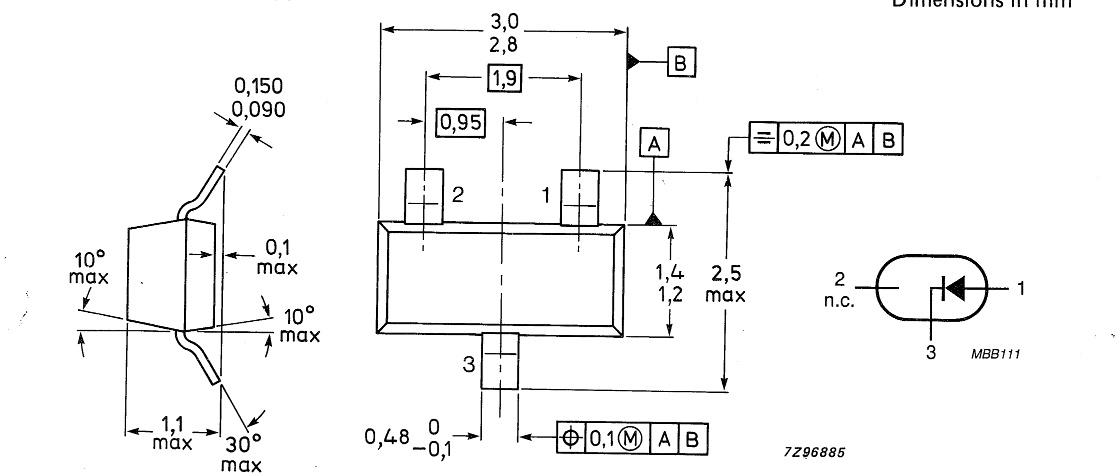
Low power general purpose voltage regulator diodes in a microminiature plastic envelope intended for application in thick and thin film circuits. The series covers the range of nominal working voltages from 3.3 to 33 V with a working voltage tolerance of ± 5%.

QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3.3 to 33	V
Working voltage tolerance			± 5	%
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.	300	mW
Junction temperature	T_j	max.	150	°C

MECHANICAL DATA

Dimensions in mm



TOP VIEW

Fig.1 SOT23.

Marking code

PMBZ 5226B = p8A	PMBZ 5238B = p8N	PMBZ 5250B = 81A
PMBZ 5227B = p8B	PMBZ 5239B = p8P	PMBZ 5251B = 81B
PMBZ 5228B = p8C	PMBZ 5240B = p8Q	PMBZ 5252B = 81C
PMBZ 5229B = p8D	PMBZ 5241B = p8R	PMBZ 5253B = 81D
PMBZ 5230B = p8E	PMBZ 5242B = p8S	PMBZ 5254B = 81E
PMBZ 5231B = p8F	PMBZ 5243B = p8T	PMBZ 5255B = 81F
PMBZ 5232B = p8G	PMBZ 5244B = p8U	PMBZ 5256B = 81G
PMBZ 5233B = p8H	PMBZ 5245B = p8V	PMBZ 5257B = 81H
PMBZ 5234B = p8J	PMBZ 5246B = p8W	
PMBZ 5235B = p8K	PMBZ 5247B = p8X	
PMBZ 5236B = p8L	PMBZ 5248B = p8Y	
PMBZ 5237B = p8M	PMBZ 5249B = p8Z	

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.	300 mW
Storage temperature	T_{stg}		−65 to + 150 °C
Junction temperature	T_j	max.	150 °C

THERMAL CHARACTERISTICS

Thermal resistance
from junction to ambient — $R_{th\ j\text{-}a}$ = 420 K/W

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage
I_F = 200 mA — V_F max. 1.1 V

type number	working voltage V_Z (V) at I_{ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0.25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) typ.
PMBZ 5226B	3.3	20	28	1600	25	1.0	−0.064
PMBZ 5227B	3.6	20	26	1700	15	1.0	−0.065
PMBZ 5228B	3.9	20	25	1900	10	1.0	−0.063
PMBZ 5229B	4.3	20	22	2000	5	1.0	−0.058
PMBZ 5230B	4.7	20	19	2000	5	1.0	−0.047
PMBZ 5231B	5.1	20	17	2000	5	2.0	−0.013
PMBZ 5232B	5.6	20	11	1600	5	3.0	+0.023
PMBZ 5233B	6.0	20	7	1600	5	3.5	+0.023
PMBZ 5234B	6.2	20	7	1000	5	4.0	+0.039
PMBZ 5235B	6.8	20	5	750	3	5.0	+0.040
PMBZ 5236B	7.5	20	6	500	3	6.0	+0.047
PMBZ 5237B	8.2	20	8	500	3	6.5	+0.052
PMBZ 5238B	8.7	20	8	600	3	6.5	+0.053
PMBZ 5239B	9.1	20	10	600	3	7.0	+0.055
PMBZ 5240B	10	20	17	600	3	8.0	+0.055
PMBZ 5241B	11	20	22	600	2	8.4	+0.058
PMBZ 5242B	12	20	30	600	1	9.1	+0.062
PMBZ 5243B	13	9.5	13	600	0.5	9.9	+0.065
PMBZ 5244B	14	9.0	15	600	0.1	10	+0.067

* Device mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.

type number	working voltage V_Z (V) at I_{ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0.25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) (typ.
PMBZ 5245B	15	8.5	16	600	0.1	11	+0.073
PMBZ 5246B	16	7.8	17	600	0.1	12	+0.073
PMBZ 5247B	17	7.4	19	600	0.1	13	+0.073
PMBZ 5248B	18	7.0	21	600	0.1	14	+0.078
PMBZ 5249B	19	6.6	23	600	0.1	14	+0.078
PMBZ 5250B	20	6.2	25	600	0.1	15	+0.080
PMBZ 5251B	22	5.6	29	600	0.1	17	+0.080
PMBZ 5252B	24	5.2	33	600	0.1	18	+0.081
PMBZ 5253B	25	5.0	35	600	0.1	19	+0.082
PMBZ 5254B	27	4.6	41	600	0.1	21	+0.085
PMBZ 5255B	28	4.5	44	600	0.1	21	+0.085
PMBZ 5256B	30	4.2	49	600	0.1	23	+0.085
PMBZ 5257B	33	3.8	58	700	0.1	25	+0.085

Notes

1. V_Z is measured with device at thermal equilibrium while mounted on a ceramic substrate of 8 mm x 10 mm x 0.7 mm.
2. $I_{(ac\ rms)}$ = 10% of I_{Ztest} resp. I_{ZK}; 1 kHz superimposed; thermal equilibrium see note 1.
3. For types PMBZ 5226B to PMBZ 5242B the current I_Z = 7.5 mA; for PMBZ 5243B and higher $I_Z = I_{Ztest}$. Testpoints at T_1 = 25 °C, T_2 = 125 °C.

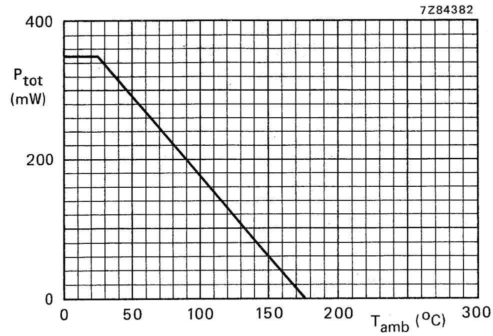


Fig. 2 Power derating curve.

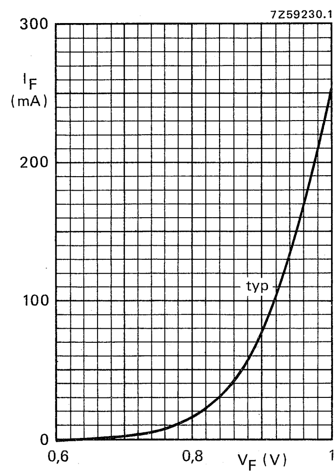


Fig. 3 Typical values at $T_j = 25\ ^oC$.
Forward current as a function of forward voltage.

HIGH-SPEED SILICON DIODES FOR SURFACE MOUNTING

These diodes are primarily designed for fast logic applications.

These SM diodes are leadless diodes in a hermetically sealed SOD80C envelope with tin-plated metal discs at each end. They are suitable for "automatic placement" and as such it can withstand immersion soldering.

The diodes are delivered in "super 8" tape.

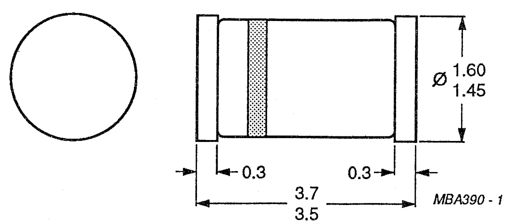
QUICK REFERENCE DATA

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
Forward voltage PMLL4148: I_F = 10 mA PMLL4446: I_F = 20 mA PMLL4448: 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 SOD80C.



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
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

Forward voltages					
PMLL4148: I_F = 10 mA; PMLL4446: I_F = 20 mA; PMLL4448: I_F = 100 mA		V_F	<	1	V
PMLL4448: 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 ^oC	PMLL4448	I_R	<	3	μA
V_R = 20 V; T_j = 150 ^oC		I_R	<	50	μA
Diode capacitance					
V_R = 0; f = 1 MHz		C_d	<	4	pF
Forward recovery voltage when switched to I_F = 50 mA; t_r = 20 ns		V_{fr}	<	2,5	V

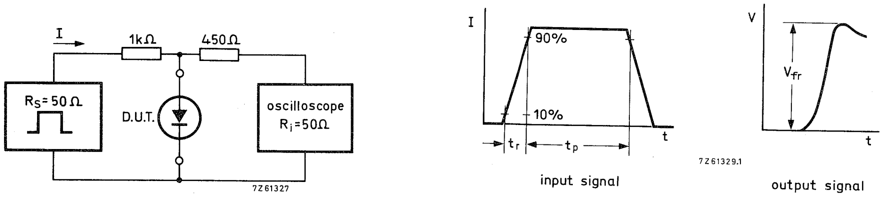


Fig. 2 Forward recovery voltage test circuit and waveforms.

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)

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

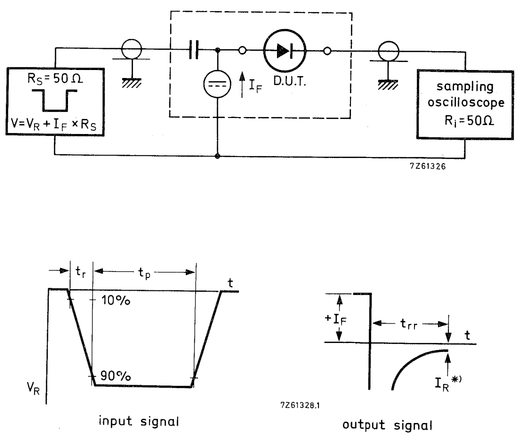


Fig. 3 Reverse recovery time test circuit and waveforms.

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)

ULTRA-HIGH-SPEED SILICON DIODES FOR SURFACE MOUNTING

Whiskerless diodes in SOD80C envelopes.
The PMLL4150 is primarily intended for general purpose use in computer and industrial applications.
The PMLL4151 and PMLL4153 are intended for military and industrial applications.

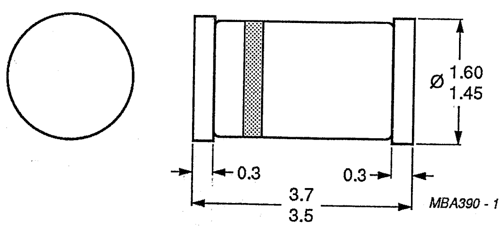
QUICK REFERENCE DATA

			PMLL4150	4151	4153	
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

Fig. 1 SOD80C.



Cathode indicated by black band.

RATINGS

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

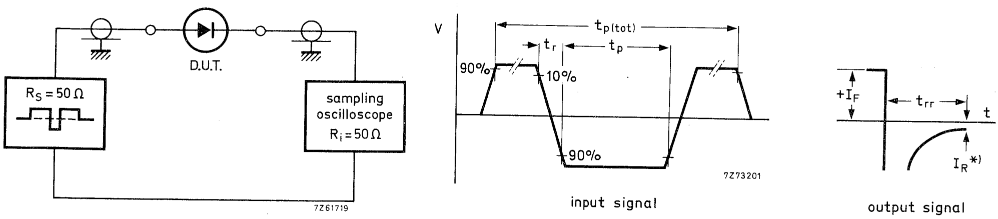
			PMLL4150	4151	4153	
Continuous reverse voltage	V_R	max.	50	50	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	75	V
Forward current (d.c.)	I_F	max.	0,30	0,20	0,20	A
Repetitive peak forward current	I_{FRM}	max.	0,60	0,45	0,45	A
Non-repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4,0	–	–	A
t = 1 s	I_{FSM}	max.	0,5	–	–	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		500		mW
Derating factor				2,85		mW/K
Storage temperature	T_{stg}			–65 to + 200		°C
Junction temperature	T_j	max.		200		°C

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			PMLL4150	4151	4153	
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 °C	I_R	<	100	50	50	μA

			PMLL4150	4151	4153	
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 Ω; measured at I_R = 0,1 x I_F	t_{rr}	<	4	–	–	ns
I_F = 200 to 400 mA to I_R = 200 to 400 mA; R_L = 100 Ω; measured at I_R = 0,1 x I_F	t_{rr}	<	6	–	–	ns
I_F = 10 mA to I_R = 1 mA; R_L = 100 Ω; measured at I_R = 0,1 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
I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; measured at I_R = 1 mA	t_{rr}	<	–	2	2	ns



*) value at which t_{rr} is measured

Fig. 2 Test circuit 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 ⩽ 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

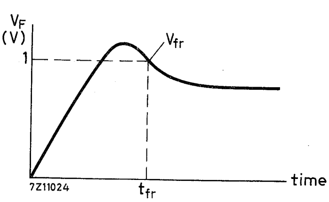


Fig. 3 PMLL4150.

VOLTAGE REGULATOR DIODES FOR SURFACE MOUNTING

Silicon planar diodes in a SOD80C envelope intended for use as low-power voltage stabilizers or voltage references.

The series consists of 43 types with nominal working voltages in the range 3,0 V to 75 V with a tolerance of ± 5%. The SM diode is a leadless diode in a hermetically sealed glass SOD80C envelope with tin-plated metal discs at each end. It is suitable for "automatic placement" and as such can withstand immersion soldering.

The diodes are delivered on "super 8" tape.

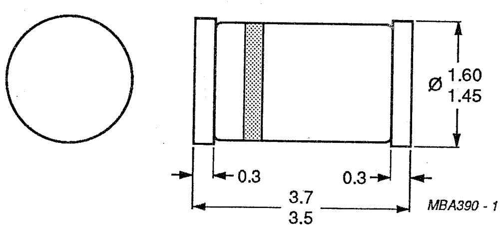
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3,0 to 75	V
Working voltage tolerance			± 5	%
Total power dissipation	P_{tot}	max.	500	mW
Non-repetitive peak reverse power dissipation T_j = 55 °C; t_p = 8,3 ms, square wave	P_{ZSM}	max.	10	W
Junction temperature	T_j		−65 to + 200	°C

MECHANICAL DATA

Dimensions in mm

Fig. 1 SOD80C.



Cathode indicated by 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 if flanges are kept at T_{flange} = 75 °C	P_{tot}	max.	500 mW
Derating factor			4 mW/K
Non-repetitive peak reverse power dissipation T_j = 55 °C; t_p = 8,3 ms, square wave	P_{ZSM}	max.	10 W
Storage temperature	T_{stg}		−65 to + 200 °C
Junction temperature	T_j		−65 to + 200 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage I_F = 200 mA	V_F	max.	1,1 V

type number	working voltage V_Z (V) at I_{ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0,25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) max.
PMLL5225B	3,0	20	29	1600	50	1,0	−0,075
PMLL5226B	3,3	20	28	1600	25	1,0	−0,070
PMLL5227B	3,6	20	24	1700	15	1,0	−0,065
PMLL5228B	3,9	20	23	1900	10	1,0	−0,060
PMLL5229B	4,3	20	22	2000	5	1,0	± 0,055
PMLL5230B	4,7	20	19	1900	5	2,0	± 0,030
PMLL5231B	5,1	20	17	1600	5	2,0	± 0,030
PMLL5232B	5,6	20	11	1600	5	3,0	+ 0,038
PMLL5233B	6,0	20	7	1600	5	3,5	+ 0,038
PMLL5234B	6,2	20	7	1000	5	4,0	+ 0,045
PMLL5235B	6,8	20	5	750	3	5,0	+ 0,050
PMLL5236B	7,5	20	6	500	3	6,0	+ 0,058
PMLL5237B	8,2	20	8	500	3	6,5	+ 0,062
PMLL5238B	8,7	20	8	600	3	6,5	+ 0,065
PMLL5239B	9,1	20	10	600	3	7,0	+ 0,068

type number	working voltage V_Z (V) at I_{Ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0,25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) max.
PMLL5240B	10	20	17	600	3	8,0	+ 0,075
PMLL5241B	11	20	22	600	2	8,4	+ 0,076
PMLL5242B	12	20	30	600	1	9,1	+ 0,077
PMLL5243B	13	9,5	13	600	0,5	9,9	+ 0,079
PMLL5244B	14	9,0	15	600	0,1	10	+ 0,082
PMLL5245B	15	8,5	16	600	0,1	11	+ 0,082
PMLL5246B	16	7,8	17	600	0,1	12	+ 0,083
PMLL5247B	17	7,4	19	600	0,1	13	+ 0,084
PMLL5248B	18	7,0	21	600	0,1	14	+ 0,085
PMLL5249B	19	6,6	23	600	0,1	14	+ 0,086
PMLL5250B	20	6,2	25	600	0,1	15	+ 0,086
PMLL5251B	22	5,6	29	600	0,1	17	+ 0,087
PMLL5252B	24	5,2	33	600	0,1	18	+ 0,088
PMLL5253B	25	5,0	35	600	0,1	19	+ 0,089
PMLL5254B	27	4,6	41	600	0,1	21	+ 0,090
PMLL5255B	28	4,5	44	600	0,1	21	+ 0,091
PMLL5256B	30	4,2	49	600	0,1	23	+ 0,091
PMLL5257B	33	3,8	58	700	0,1	25	+ 0,092
PMLL5258B	36	3,4	70	700	0,1	27	+ 0,093
PMLL5259B	39	3,2	80	800	0,1	30	+ 0,094
PMLL5260B	43	3,0	93	900	0,1	33	+ 0,095
PMLL5261B	47	2,7	105	1000	0,1	36	+ 0,095
PMLL5262B	51	2,5	125	1100	0,1	39	+ 0,096
PMLL5263B	56	2,2	150	1300	0,1	43	+ 0,096
PMLL5264B	60	2,1	170	1400	0,1	46	+ 0,097
PMLL5265B	62	2,0	185	1400	0,1	47	+ 0,097
PMLL5266B	68	1,8	230	1600	0,1	52	+ 0,097
PMLL5267B	75	1,7	270	1700	0,1	56	+ 0,098

Notes to the characteristics

1. V_Z is measured with device at thermal equilibrium while held in clips in still air at 25 °C.
2. $I_{(ac\ rms)}$ = 10% of I_{Ztest} resp. I_{ZK}, 60 Hz superimposed.
3. For types PMLL5225B to PMLL5242B the current I_Z = 7,5 mA; for PMLL5243B and higher $I_Z = I_{Ztest}$. Testpoints at T_1 = 25 °C, T_2 = 125 °C.

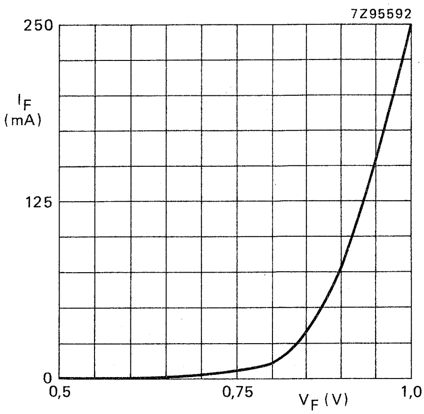


Fig. 2 T_{amb} = 25 °C; typical values.

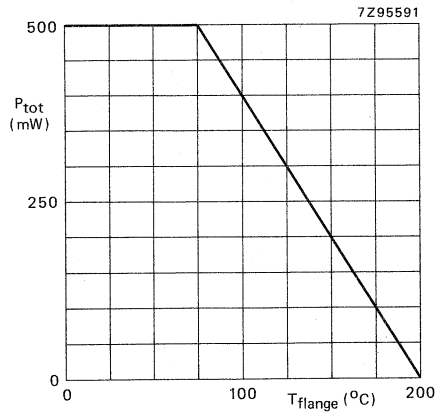


Fig. 3 Total power dissipation versus flange temperature.

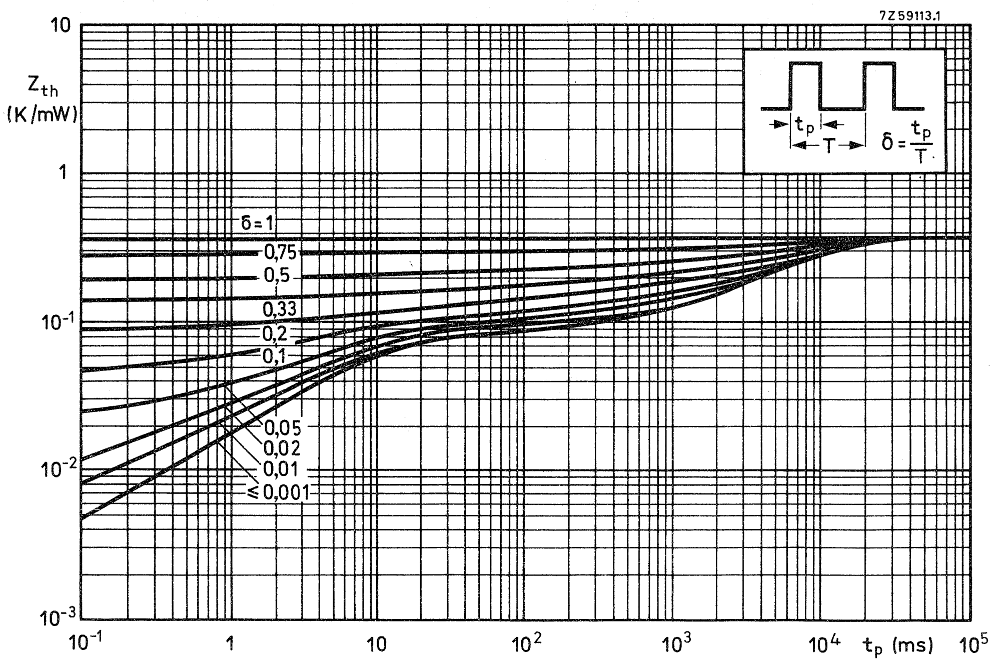


Fig. 4 Thermal impedance versus pulse duration.

SILICON DIFFUSED RECTIFIER DIODES

A range of silicon rectifier diodes for general use in leadless **SMID*** envelopes.

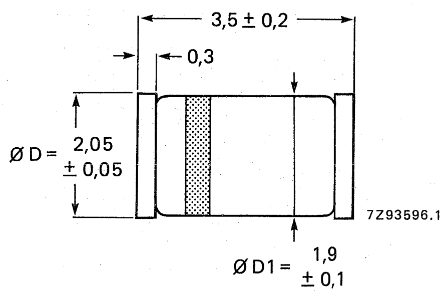
QUICK REFERENCE DATA

			PRLL4001	PRLL4002	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	V
Continuous reverse voltage	V_R	max.	50	100	V
Average forward current	$I_{F(AV)}$	max.	1.6		A
Repetitive peak forward current	I_{FRM}	max.	10		A
Non-repetitive peak forward current	I_{FSM}	max.	20		A

MECHANICAL DATA

Dimensions in mm

Fig.1 SOD87.



* Surface-mounted implosion diode.

RATINGS

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

			PRLL4001	PRLL4002	
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	V
Continuous reverse voltage	V_R	max.	50	100	V
Average forward current (averaged over any 20 ms period) up to T_{tp} = 105 °C	$I_{F(AV)}$	max.	1.6		A
at T_{amb} = 65 °C mounted on a printed-circuit board	$I_{F(AV)}$	max.	0.68		A
Repetitive peak forward current	I_{FRM}	max.	10		A
Non-repetitive peak forward current (half-cycle sinewave, 60 Hz)	I_{FSM}	max.	20		A
Storage temperature range	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	$R_{th\ j\text{-}tp}$	=	30	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 (see Fig.2)	$R_{th\ j\text{-}a}$	=	150	K/W

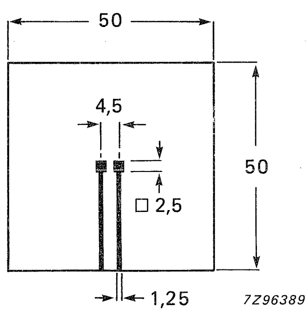


Fig.2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage				
I_F = 1 A	V_F	max.	1.1	V
Full-cycle average forward voltage				
$I_{F(AV)}$ = 1 A	$V_{F(AV)}$	max.	0.8	V
Reverse current				
$V_R = V_{Rmax}$	I_R	max.	10	μA
$V_R = V_{Rmax}$; T_{amb} = 100 °C	I_R	max.	50	μA
Full-cycle average reverse current				
$V_R = V_{RRMmax}$; T_{amb} = 75 °C	$I_{R(AV)}$	max.	30	μA

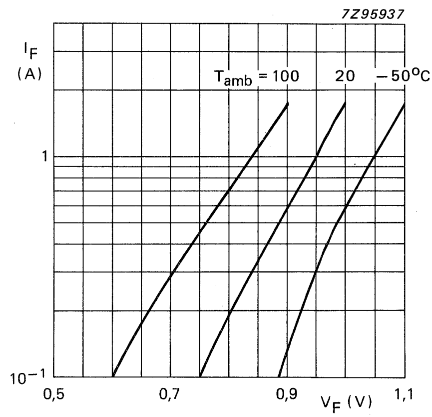


Fig.3 Typical forward current as a function of forward voltage.

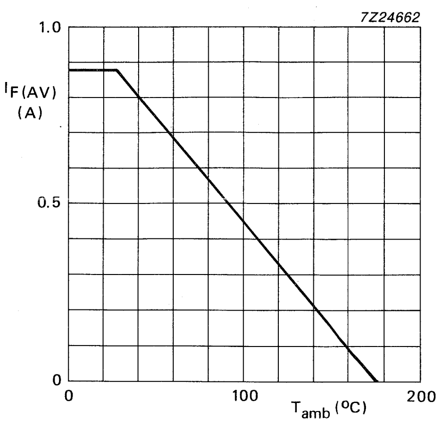


Fig.4 Maximum forward current as a function of temperature.

SCHOTTKY BARRIER DIODES

Schottky barrier diodes in hermetically sealed leadless SOD87 SMID* envelope. They are intended for use in low output voltage, low power switched-mode power supplies and high-frequency circuits where low conduction and switching losses are important.

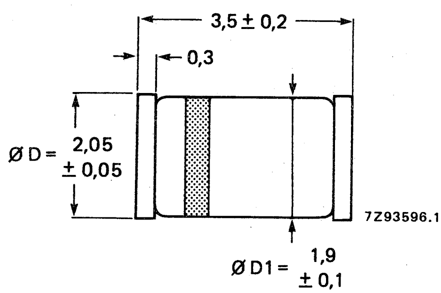
QUICK REFERENCE DATA

			PRLL5817	18	19	
Repetitive peak reverse voltage	V_{RRM}	max.	20	30	40	V
Crest working reverse voltage	V_{RWM}	max.	20	30	40	V
Continuous reverse voltage	V_R	max.	20	30	40	V
Non-repetitive peak reverse voltage	V_{RSM}	max.	24	36	48	V
Average forward current	$I_{F(AV)}$	max.		1		A
Non-repetitive peak forward current	I_{FSM}	max.		25		A
Junction temperature	T_j	max.		125		°C

MECHANICAL DATA

Dimensions in mm

Fig.1 SOD87.



* Surface Mounted Implosion Diode.

RATINGS

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

			PRLL5817	18	19	
Repetitive peak reverse voltage	V_{RRM}	max.	20	30	40	V
Crest working reverse voltage	V_{RWM}	max.	20	30	40	V
Continuous reverse voltage	V_R	max.	20	30	40	V
Non-repetitive peak reverse voltage	V_{RSM}	max.	24	36	48	V
Average forward current (a = 1); T_{amb} = 60 °C; see Fig.2	$I_{F(AV)}$	max.		1		A
Non-repetitive peak forward current t = 10 ms; half sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = 0$	I_{FSM}	max.		25		A
Storage temperature range	T_{stg}			−65 to + 175		°C
Junction temperature	T_j	max.		125		°C

THERMAL RESISTANCE

Influence of mounting method

1. Thermal resistance from junction to tie-point	$R_{th\,j\text{-}tp}$	=	30	K/W
2. Thermal resistance from junction to ambient; device mounted on a 1.5 mm thick epoxy-glass printed-circuit board; Cu thickness ⩾ 40 μm; see Fig.2	$R_{th\,j\text{-}a}$	=	150	K/W

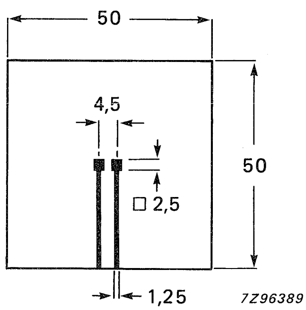


Fig.2 Mounted on a printed-circuit board.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

			PRLL5817	18	19	
Forward voltage						
I_F = 0.1 A	V_F	max.	320	330	340	mV
I_F = 1 A	V_F	max.	450	550	600	mV
I_F = 3 A	V_F	max.	750	875	900	mV
Reverse current						
$V_R = V_{RRM\,max}$	I_R	max.	1.0	0.5	0.5	mA
$V_R = V_{RRM\,max}$; T_j = 100 °C	I_R	max.	10	5	5	mA
Diode capacitance						
V_R = 4 V; f = 1 MHz	C_d	typ.	70	50	50	pF

OPERATING NOTE

Calculation of $I_{F(AV)}$-rating

For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses are a significant part of the total power losses. For that reason the starting point for the calculation of the $I_{F(AV)}$-rating should be the maximum permissible junction temperature $T_{j\,max}$.

Method of calculation

1. Input:
   type
   V_{RWM} and its duty cycle δ
   T_{amb}
   $a = I_{F(RMS)}/I_{F(AV)}$
2. Determine the maximum permissible junction temperature $T_{j\,max}$ (125 °C or the temperature at which thermal runaway occurs, whichever is lowest) from Figs 7, 9 or 11.
3. Determine the reverse power losses P_R from Figs 8, 10 or 12 and multiply P_R by 150 K/W, giving a certain number of degrees centigrade (this being the increase of junction temperature caused by reverse power dissipation).
4. Calculate T_R by subtracting the calculated number of degrees centigrade (15 °C or less) from the maximum permissible junction temperature.
5. Substract T_{amb} from T_R (giving the admissible increase of junction temperature caused by forward dissipation) and calculate the admissible forward power dissipation by means of the formula;
   $P_F = (T_R - T_{amb})/R_{th\,j\text{-}a}$.
6. Determine the $I_{F(AV)}$-rating from Figs 4, 5 or 6.

   Example: PRLL5818; V_{RWM} = 22 V; δ = 0.5; T_{amb} = 60 °C; a = 1.42.

   Find $T_{j\,max}$ from Fig.9: 112 °C.

   Find P_R from Fig.10: 0.1 W.
   $P_R \times R_{th\,j\text{-}a}$ = 0.1 x 150 = 15 °C.

   Calculate T_R: 112 – 15 = 97 °C.
   Calculate P_F : (97 – 60)/150 = 0.25 W.
   Find $I_{F(AV)max}$ from Fig.5, for a = 1.42: $I_{F(AV)max}$ = 0.5 A.

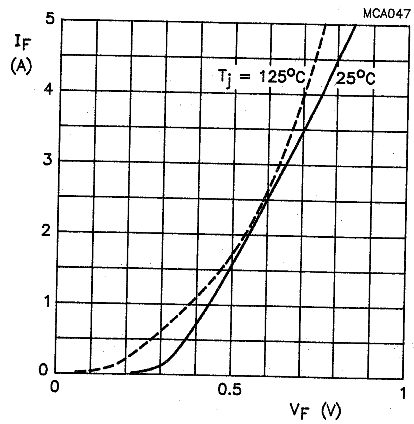


Fig.3 **PRLL5817; 18; 19.** Typical forward voltage.

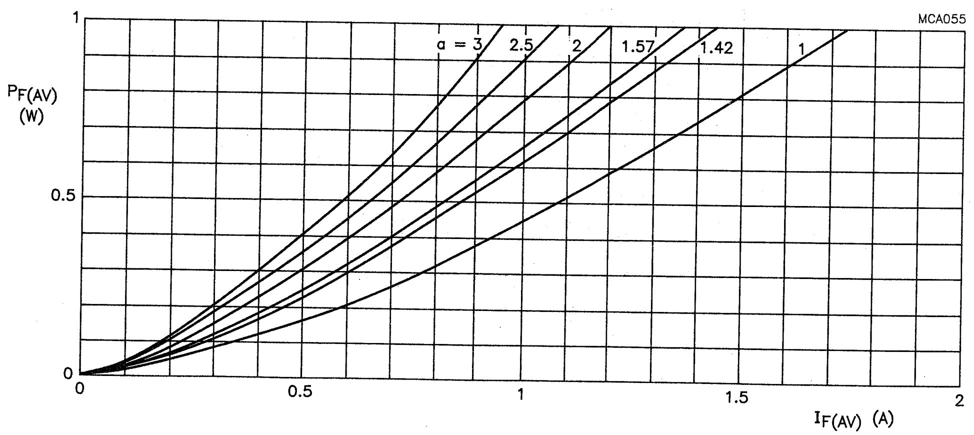


Fig.4 **PRLL5817.** Maximum values steady state forward power dissipation as a function of the average forward current; $a = I_{F(RMS)}/I_{F(AV)}$.

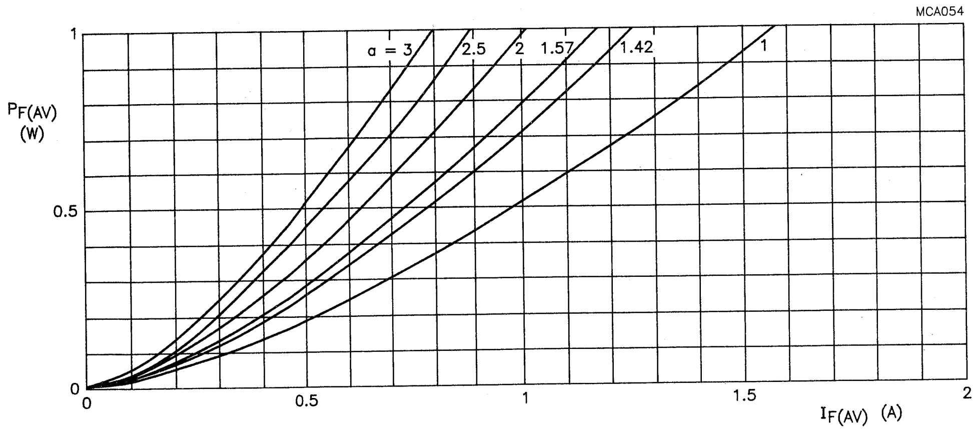


Fig.5 **PRLL5818**. Maximum values steady state forward power dissipation as a function of the average forward current; $a = I_{F(RMS)}/I_{F(AV)}$.

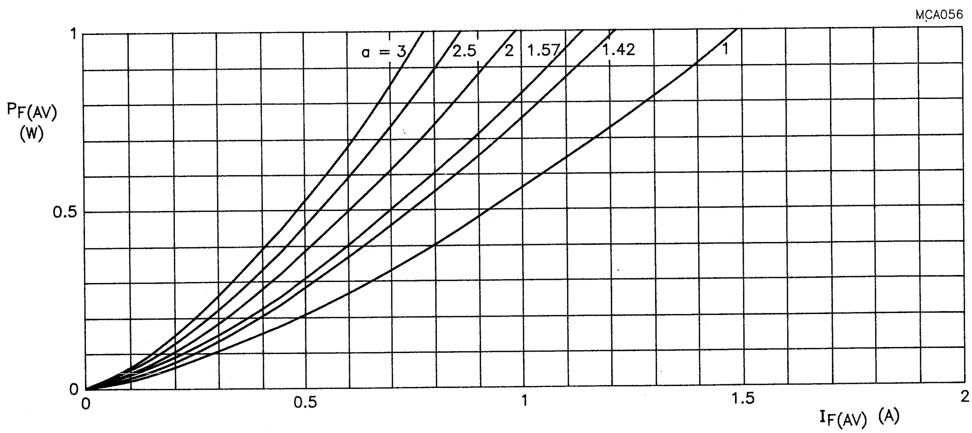


Fig.6 **PRLL5819.** Maximum values steady state forward power dissipation as a function of the average forward current; $a = I_{F(RMS)}/I_{F(AV)}$.

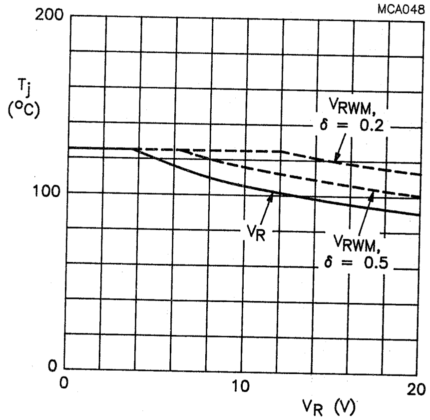


Fig.7 **PRLL5817**. Maximum permissible junction temperature as a function of reverse voltage; device mounted as shown in Fig.2.

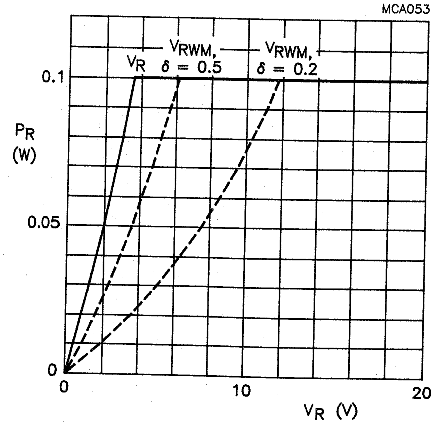


Fig.8 **PRLL5817**. Reverse power dissipation as a function of reverse voltage (max. values); device mounted as shown in Fig.2.

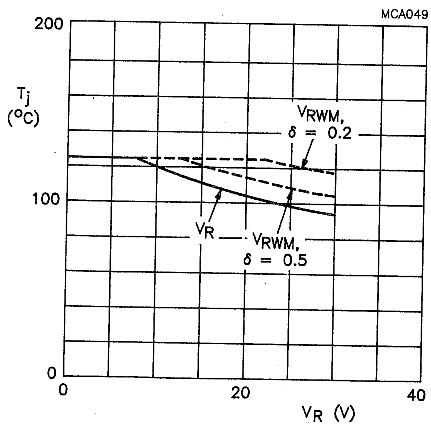


Fig.9 **PRLL5818**. Maximum permissible junction temperature as a function of reverse voltage; device mounted as shown in Fig.2.

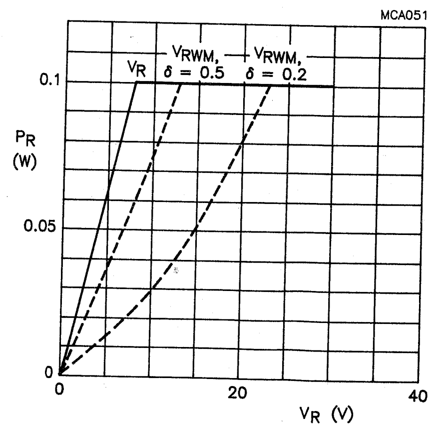


Fig.10 **PRLL5818**. Reverse power dissipation as a function of reverse voltage (max. values); device mounted as shown in Fig.2.

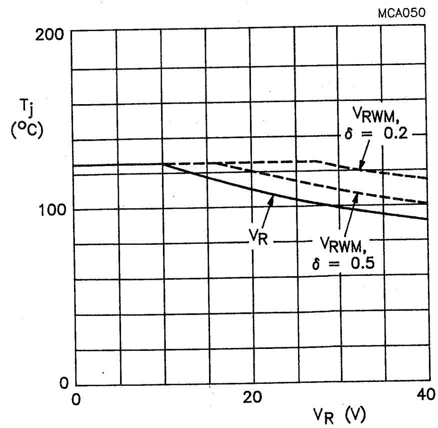


Fig.11 **PRLL5819**. Maximum permissible junction temperature as a function of reverse voltage; device mounted as shown in Fig.2.

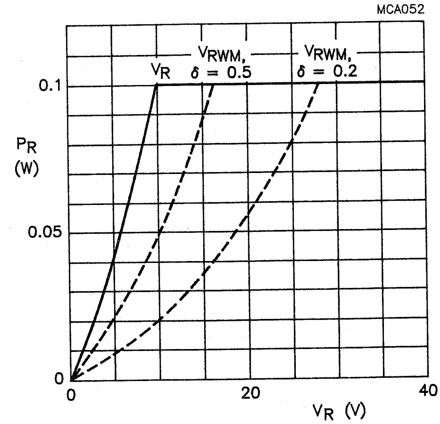


Fig.12 **PRLL5819**. Reverse power dissipation as a function of reverse voltage (max. values); device mounted as shown in Fig.2.

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.

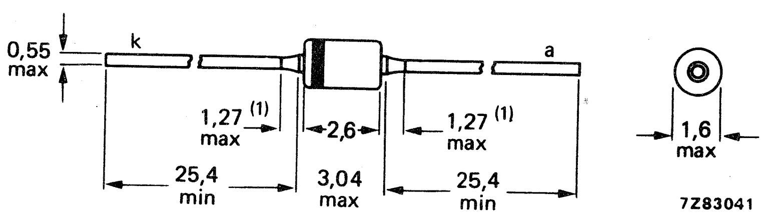
QUICK REFERENCE DATA

				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.
The marking band indicates the cathode.
The diodes are type branded.

* 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	$\lvert\Delta V_{ref}\rvert$	<	96	mV
	1N823; A	$\lvert\Delta V_{ref}\rvert$	<	48	mV
	1N825; A	$\lvert\Delta V_{ref}\rvert$	<	19	mV
	1N827; A	$\lvert\Delta V_{ref}\rvert$	<	9	mV
	1N829; A	$\lvert\Delta V_{ref}\rvert$	<	5	mV
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
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:

$$S_Z = \frac{(V_{ref\ 1} - V_{ref\ 2}) \times 100}{(T_{amb\ 2} - T_{amb\ 1}) \times V_{ref\ nom}}\ \%/K$$

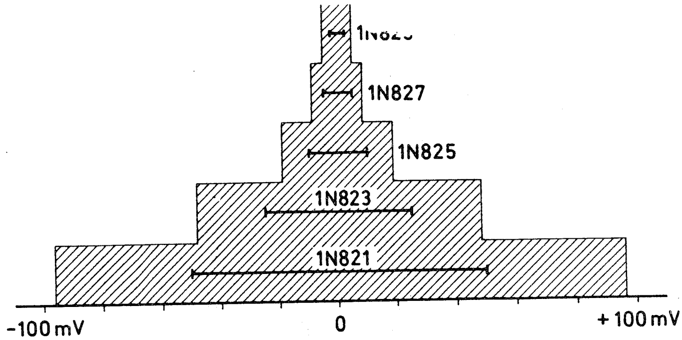


Fig. 2.

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.

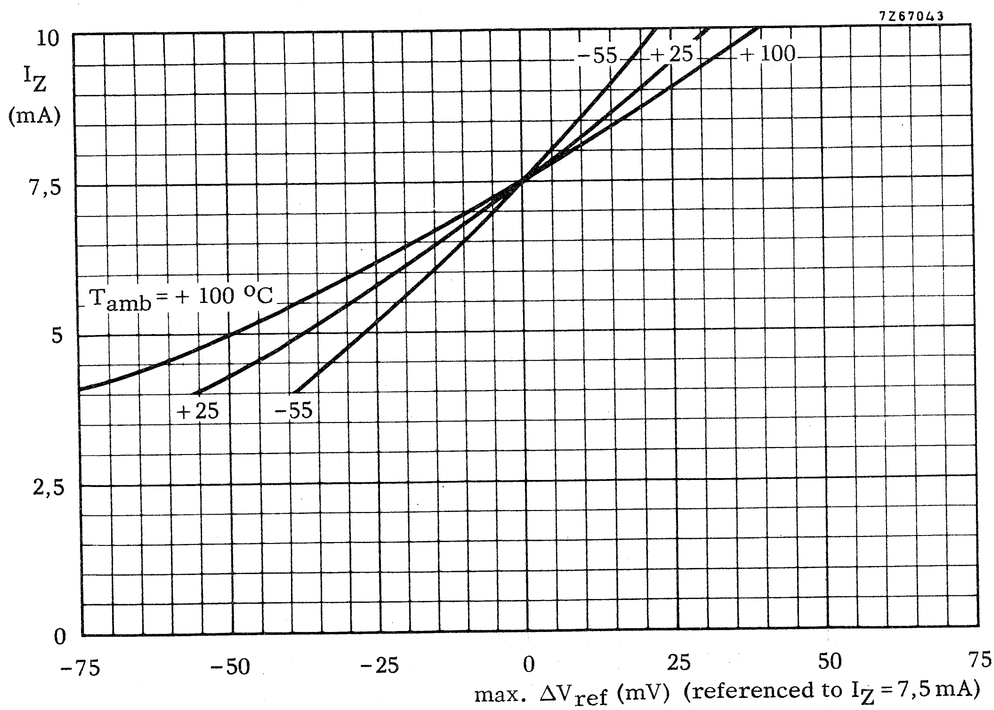


Fig. 3.

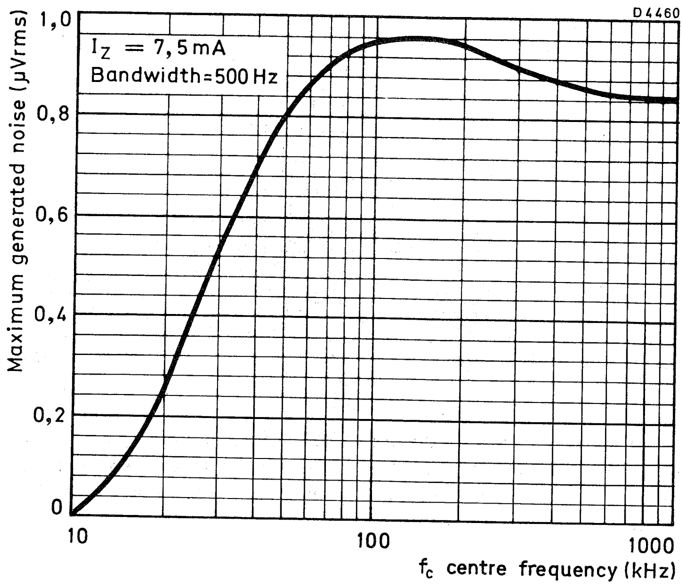

D4460
Maximum generated noise (μVrms)
1,0
0,8
0,6
0,4
0,2
0
I_Z = 7,5 mA
Bandwidth = 500 Hz
10
100
1000
f_c centre frequency (kHz)

Fig. 4.

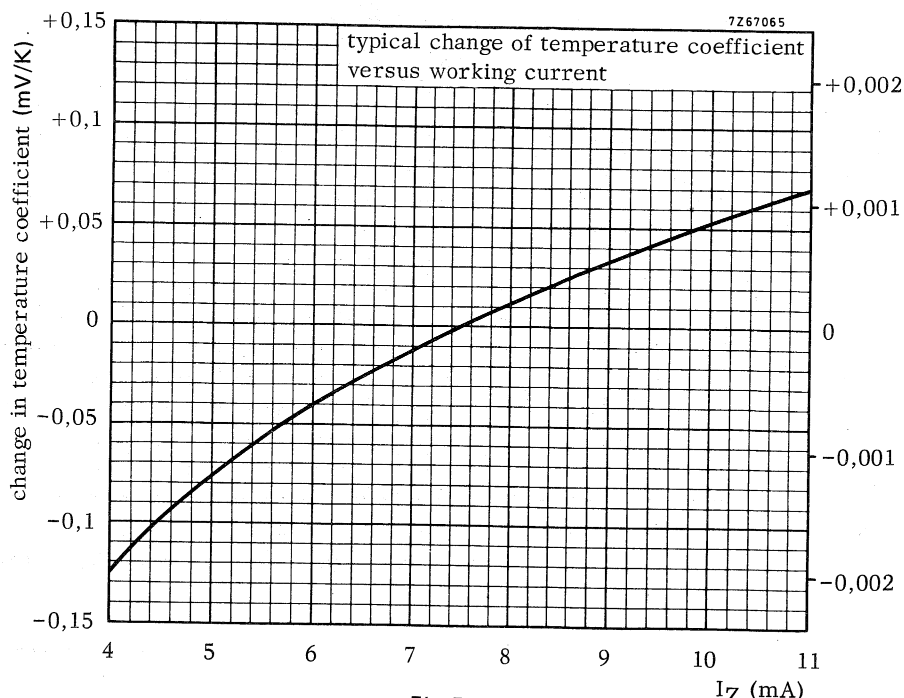

7Z67065
typical change of temperature coefficient versus working current
change in temperature coefficient (mV/K)
+0,15
+0,1
+0,05
0
−0,05
−0,1
−0,15
change in temperature coefficient (%/K)
+0,002
+0,001
0
−0,001
−0,002
4
5
6
7
8
9
10
11
I_Z (mA)

Fig. 5.

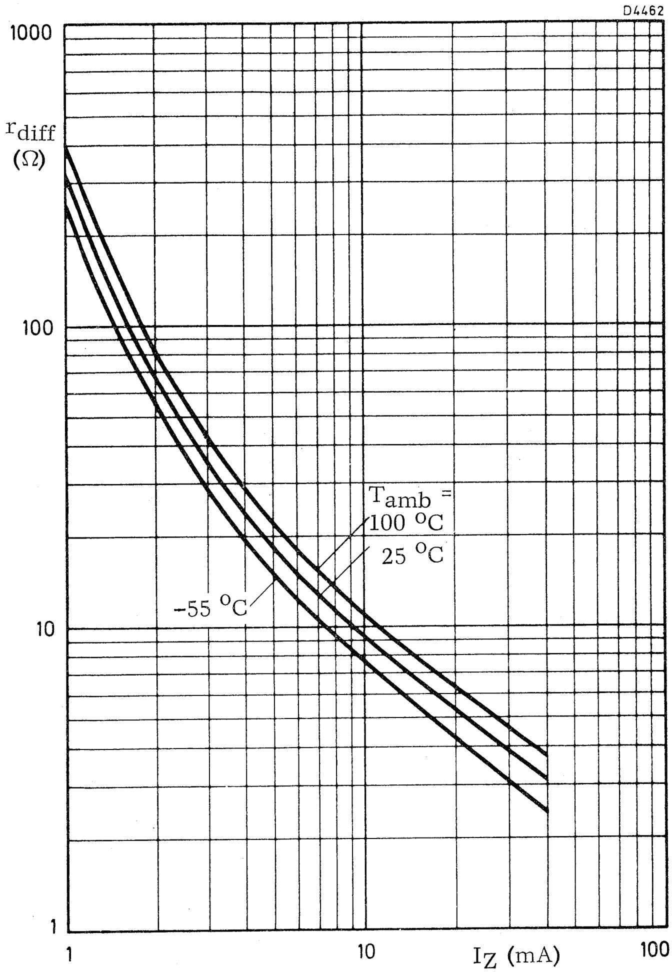


Fig. 6.

HIGH-SPEED SILICON DIODES

Planar epitaxial diodes intended for general purpose applications.

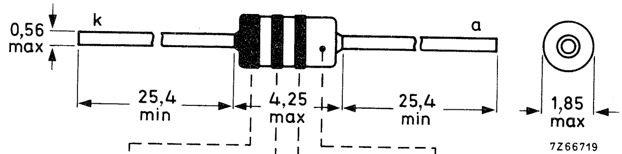
QUICK REFERENCE DATA

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 Ω; 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

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

Products approved to CECC 50 001-21.

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

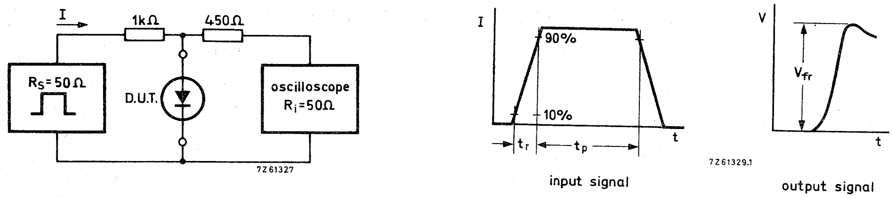
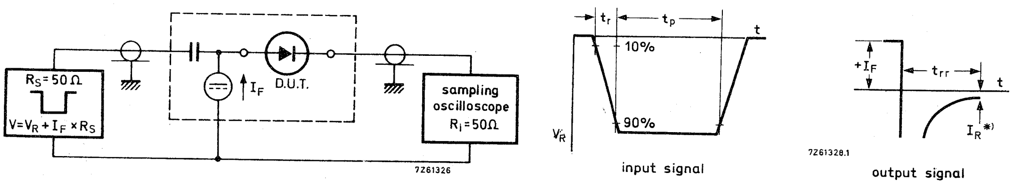


Fig. 2 Test circuit and waveforms forward recovery voltage. Input signal: Rise time of the forward pulse, t_r = 20 ns; forward current pulse duration, t_p = 120 ns; duty factor, d = 0,01. Oscilloscope rise time, t_r = 0,35 ns. Circuit capacitance < 1 pF (oscilloscope input capacitance and parasitic capacitance).

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 η > 45 %

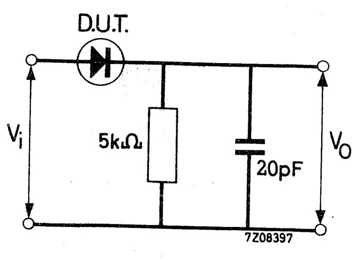


Fig. 4 Test circuit. $\eta = \dfrac{V_o}{V_{i(rms)}\sqrt{2}}$

SILICON DIFFUSED RECTIFIER DIODES

A range of silicon rectifier diodes for general purpose use.

QUICK REFERENCE DATA

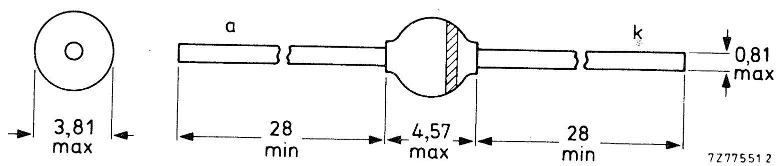
			1N4001G	4002G	4003G	4004G	4005G	4006G	4007G
Repetitive peak reverse voltage	V_{RRM}	max.	50	100	200	400	600	800	1000 V
Continuous reverse voltage	V_R	max.	50	100	200	400	600	800	1000 V

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

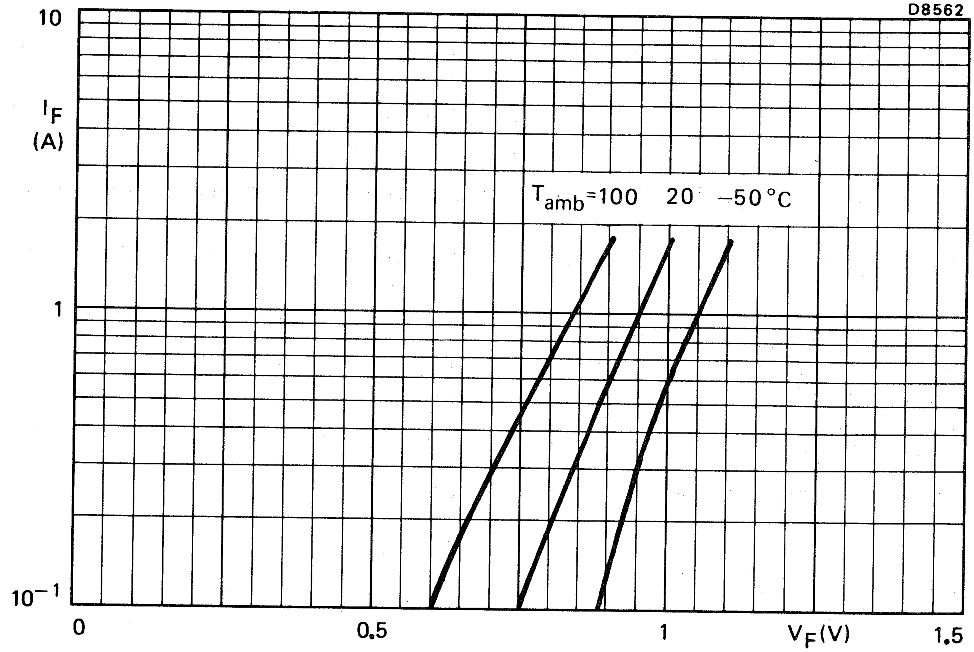


Fig. 2 Typical values.

Fig. 3 Maximum permissible d.c. forward current.

SILICON DIFFUSED RECTIFIER DIODES

This data sheet contains a range of silicon rectifier diodes for general purpose use.

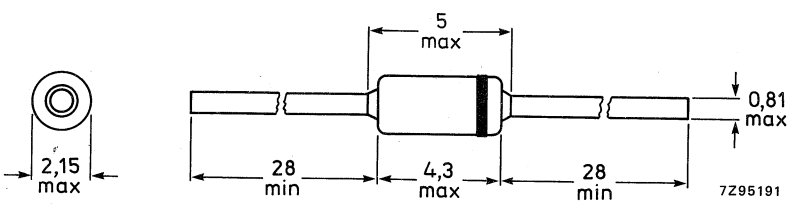
QUICK REFERENCE DATA

			1N4001ID	4002ID	4003ID	4004ID	4005ID	4006ID	4007ID
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.	1,0	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current	I_{FSM}	max.	20	A

MECHANICAL DATA

Dimensions in mm



The marking band indicates cathode.

Fig. 1 SOD-81.

RATINGS

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

			1N4001ID	4002ID	4003ID	4004ID	4005ID	4006ID	4007ID	
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.	1,0	A
at T_{amb} = 100 °C	$I_{F(AV)}$	max.	0,75	A
Repetitive peak forward current	I_{FRM}	max.	10	A
Non-repetitive peak forward current (half-cycle sinewave, 60 Hz)	I_{FSM}	max.	20	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	$R_{th\ j\text{-}tp}$	=	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	$R_{th\ j\text{-}a}$	=	120	K/W

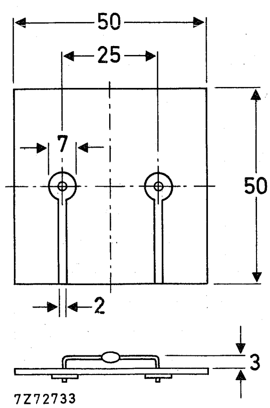


Fig. 2 Device mounted on a printed circuit board.

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

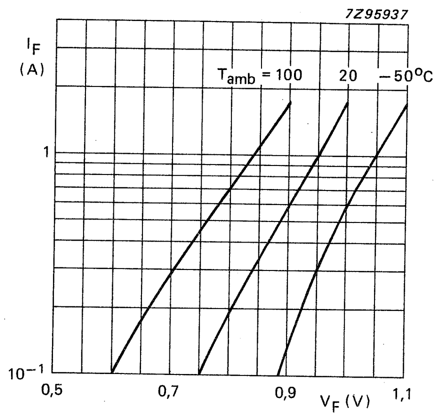


Fig. 3 Typical forward current as a function of forward voltage.

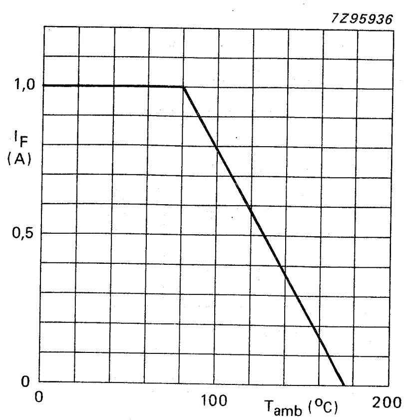


Fig. 4 Maximum forward current as a function of temperature.

HIGH-SPEED SILICON DIODES

Whiskerless diodes in subminiature DO-35 envelopes.
These diodes are primarily intended for fast logic applications.

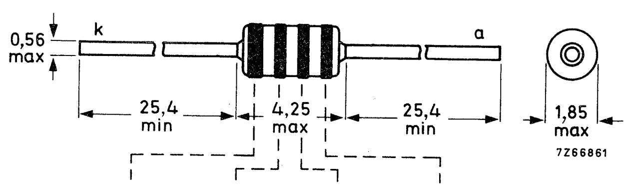
QUICK REFERENCE DATA

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	yellow	yellow	grey
	(cathode)			

Note:
Also available with type number markings and cathode side indicated by a coloured band.

Products, available to CECC 50 001-021.

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

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

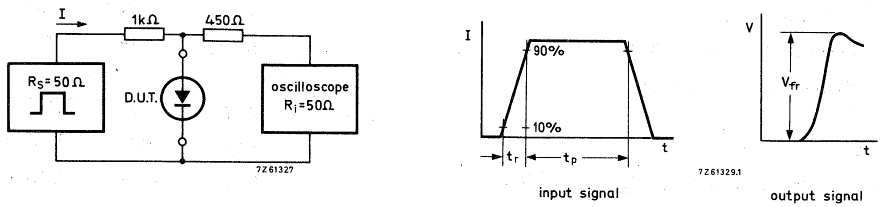
Forward voltages				
1N4148: I_F = 10 mA **1N4446**: I_F = 20 mA **1N4448**: I_F = 100 mA		V_F	<	1 V
1N4448: I_F = 5 mA		V_F	0,62 to 0,72 V	
Reverse avalanche breakdown voltage				
I_R = 100 μA		$V_{(BR)R}$	>	100 V
I_R = 5 μA		$V_{(BR)R}$	>	75 V
Reverse currents				
V_R = 20 V		I_R	<	25 nA
V_R = 20 V; 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	: 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

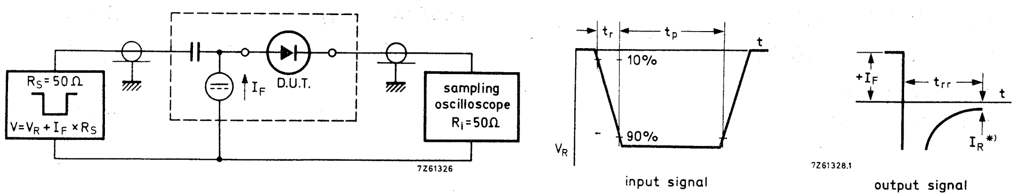
Circuit capacitance C ≤ 1 pF (C = oscilloscope input capacitance + parasitic capacitance)

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	: 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.

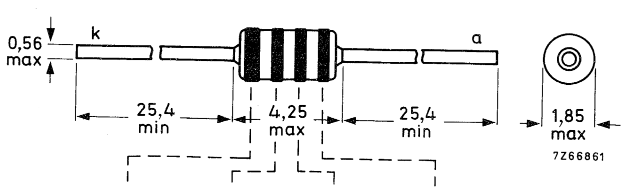
QUICK REFERENCE DATA

			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						
$t = 1\ \mu s$	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; $R_L = 100\ \Omega$; measured at $I_R = 40$ 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

MECHANICAL DATA

Dimensions in mm

Fig. 1 DO-35 (SOD27).



IN4150 :	yellow	brown	green	black
IN4151 :	yellow	brown	green	brown
IN4153 :	yellow	brown	green	orange
	(cathode)			

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

RATINGS

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

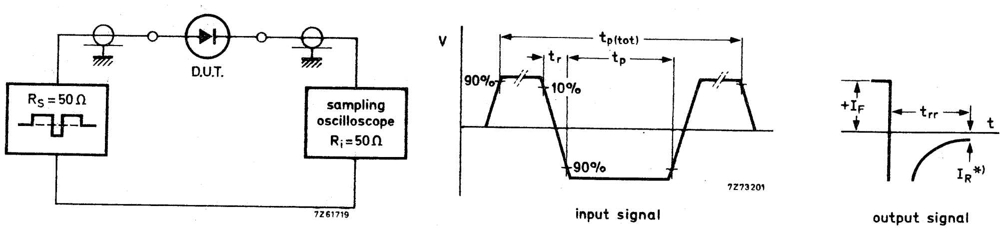
			IN4150	IN4151	IN4153	
Continuous reverse voltage	V_R	max.	50	50	50	V
Repetitive peak reverse voltage	V_{RRM}	max.	–	75	75	V
Forward current (d.c.)	I_F	max.	0,30	0,20	0,20	A
Repetitive peak forward current	I_{FRM}	max.	0,60	0,45	0,45	A
Non-repetitive peak forward current						
t = 1 μs	I_{FSM}	max.	4,0	–	–	A
t = 1 s	I_{FSM}	max.	0,5	–	–	A
Total power dissipation up to T_{amb} = 25 °C	P_{tot}	max.		500		mW
Derating factor				2,85		mW/K
Storage temperature	T_{stg}			–65 to + 200		°C
Junction temperature	T_j	max.		200		°C

CHARACTERISTICS

T_j = 25 °C 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 °C	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 Ω; 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 Ω; 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 Ω; measured at I_R = 0,1 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
I_F = 10 mA to I_R = 60 mA; R_L = 100 Ω; 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 ⩽ 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 — t_{fr} < 10 ns

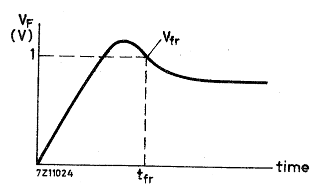


Fig. 3 IN4150.

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.

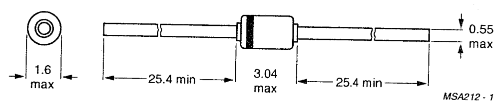
QUICK REFERENCE DATA

			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		^oC
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).



The marking band indicates the cathode.
The diodes are type-branded.

Products approved to CECC 50 001-061.

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

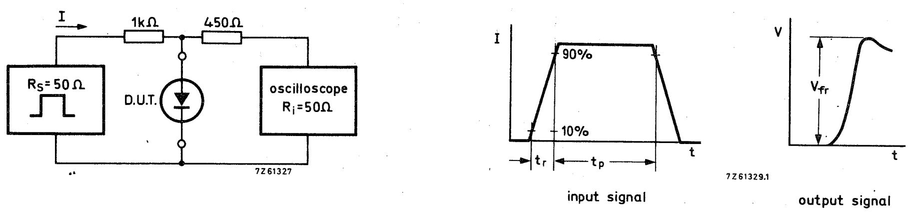


Fig. 2 Test circuit and waveforms.

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

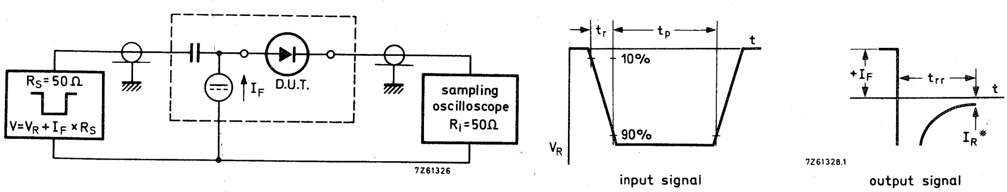


Fig. 3 Test circuit and waveforms.

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

* I_R = 1 mA

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

VOLTAGE REGULATOR DIODES

Silicon planar diodes in DO-41 envelope intended for use as low voltage stabilizers.
The series consists of 22 types with nominal working voltages ranging from 3.3 V to 24 V.

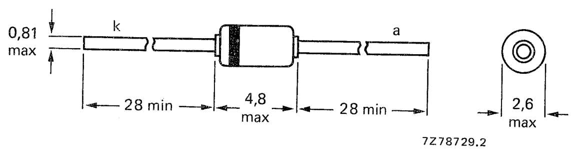
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3.3 to 24	V
Working voltage tolerance			± 5	%
Total power dissipation	P_{tot}	max.	1	W
Junction temperature	T_j		−65 to + 200	°C

MECHANICAL DATA

Dimensions in mm

Fig.1 DO-41 (SOD-66).



The marking band indicates the cathode.
The diodes are type-branded.

RATINGS

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

Working current (DC) T_{amb} = 50 °C	I_{ZM}	see table below		
Non-repetitive peak reverse (surge) current (see note 3)	I_{ZSM}	see table below		
Total power dissipation T_{amb} = 50 °C	P_{tot}	max.	1	W
Derating factor			6.67	mW/K
Storage temperature range	T_{stg}		−65 to + 200	°C
Junction temperature	T_j		−65 to + 200	°C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage I_F = 200 mA	V_F	max.	1.2	V

CHARACTERISTICS (continued)

type number	nominal working voltage V_Z (V) at I_{Ztest} (note 1)	test current DC I_{Ztest} (mA)	max. zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	Z_{ZK} (Ω) at I_{ZK} (note 2)	I_{ZK} (mA)	maximum reverse current I_R (μA) at V_R	V_R (V)	maximum working current I_{ZM} (mA)	maximum surge current I_{ZSM} (mA) (note 3)
1N4728A	3.3	76	10	400	1	100	1	276	1380
1N4729A	3.6	69	10	400	1	100	1	252	1260
1N4730A	3.9	64	9	400	1	50	1	234	1190
1N4731A	4.3	58	9	400	1	10	1	217	1070
1N4732A	4.7	53	8	500	1	10	1	193	970
1N4733A	5.1	49	7	550	1	10	1	178	890
1N4734A	5.6	45	5	600	1	10	2	162	810
1N4735A	6.2	41	2	700	1	10	3	146	730
1N4736A	6.8	37	3.5	700	1	10	4	133	660
1N4737A	7.5	34	4	700	0.5	10	5	121	605
1N4738A	8.2	31	4.5	700	0.5	10	6	110	550
1N4739A	9.1	28	5	700	0.5	10	7	100	500
1N4740A	10	25	7	700	0.25	10	7.6	91	454
1N4741A	11	23	8	700	0.25	5	8.4	83	414
1N4742A	12	21	9	700	0.25	5	9.1	76	380
1N4743A	13	19	10	700	0.25	5	9.9	69	344
1N4744A	15	17	14	700	0.25	5	11.4	61	304
1N4745A	16	15.5	16	700	0.25	5	12.2	57	285
1N4746A	18	14	20	750	0.25	5	13.7	50	250
1N4747A	20	12.5	22	750	0.25	5	15.2	45	225
1N4748A	22	11.5	23	750	0.25	5	16.7	41	205
1N4749A	24	10.5	25	750	0.25	5	18.2	38	190

Notes

1. V_Z is measured with device at thermal equilibrium while held in clips at 10 mm from body in still air at 25 °C.
2. $I_{(AC\ RMS)}$ = 10% of I_{Ztest} resp. I_{ZK}, 60 Hz superimposed.
3. Half square wave or equivalent sine wave pulse 1/120 second duration superimposed on I_{Ztest}.

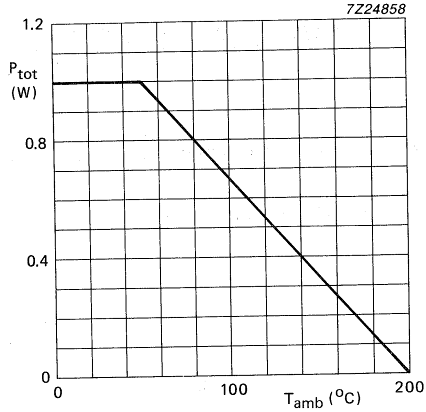


Fig.2.

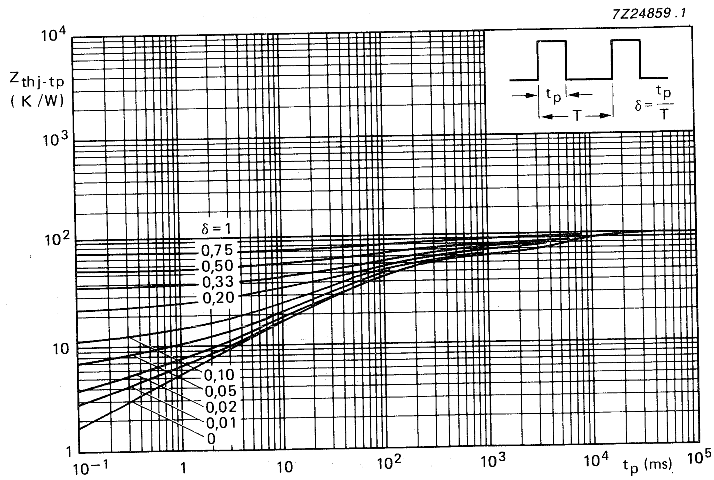


Fig.3.

Thermal impedance from junction to tie-point with a lead length of 4 mm.

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.

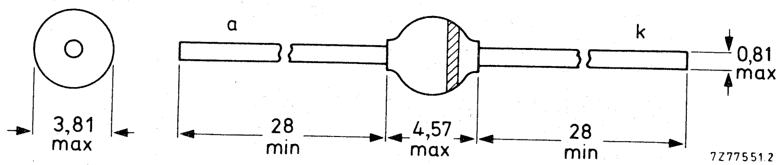
QUICK REFERENCE DATA

			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.

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

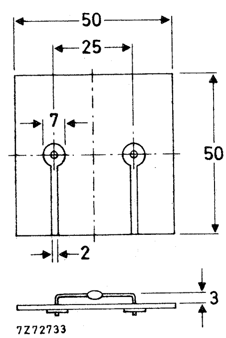


Fig. 2 Device mounted on a printed circuit board.

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

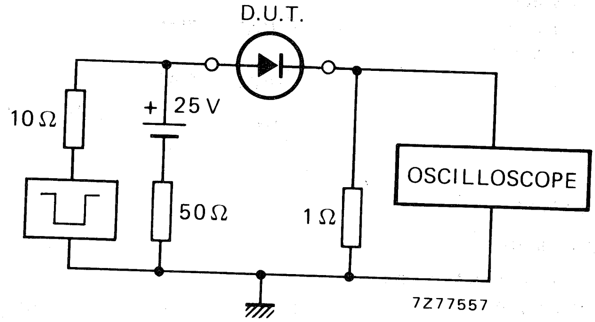


Fig. 3 Test circuit.
Input impedance oscilloscope 1 MΩ; 22 pF. Rise time ⩽ 7 ns.
Source impedance 50 Ω. Rise time ⩽ 15 ns.

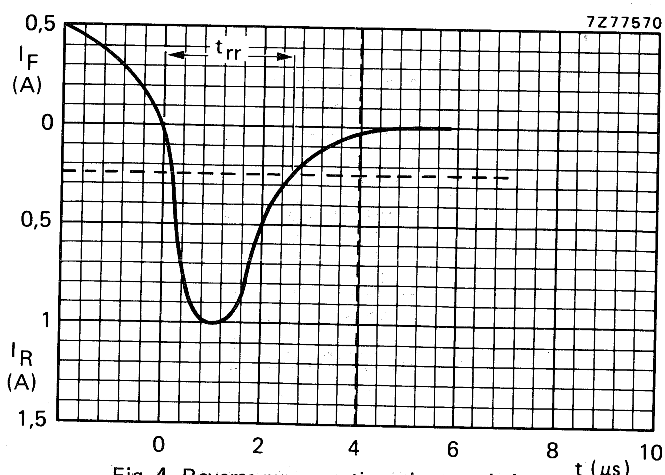


Fig. 4 Reverse recovery time characteristic.

Measured under pulse conditions to avoid excessive dissipation.
* Illuminance ⩽ 500 lux (daylight); relative humidity < 65%.

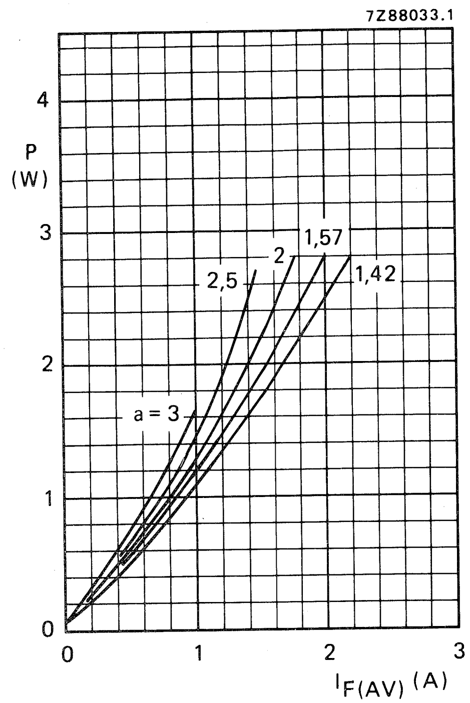


Fig. 5 Steady state power dissipation (forward plus leakage current excluding switching losses) as a function of the average forward current.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWMmax}$.

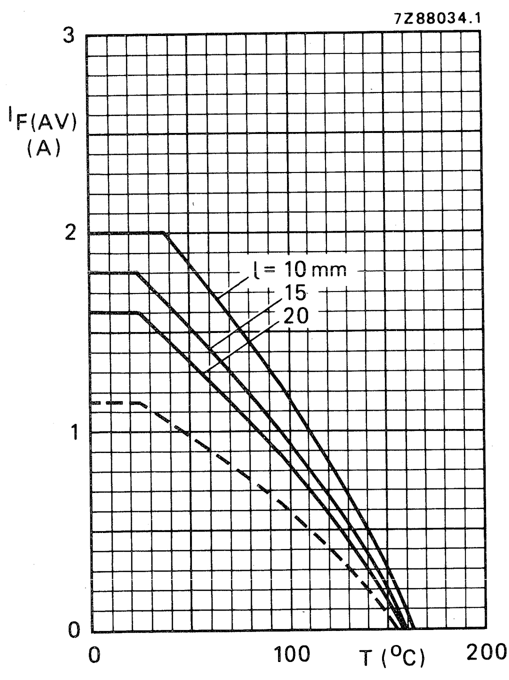


Fig. 6 Maximum average forward current as a function of the temperature.
The curves include losses due to reverse current.
a = 1,57; $V_R = V_{RWMmax}$; l = lead length
——— T = tie-point temperature
– – – – T = ambient temperature and device mounted as shown in Fig. 2.

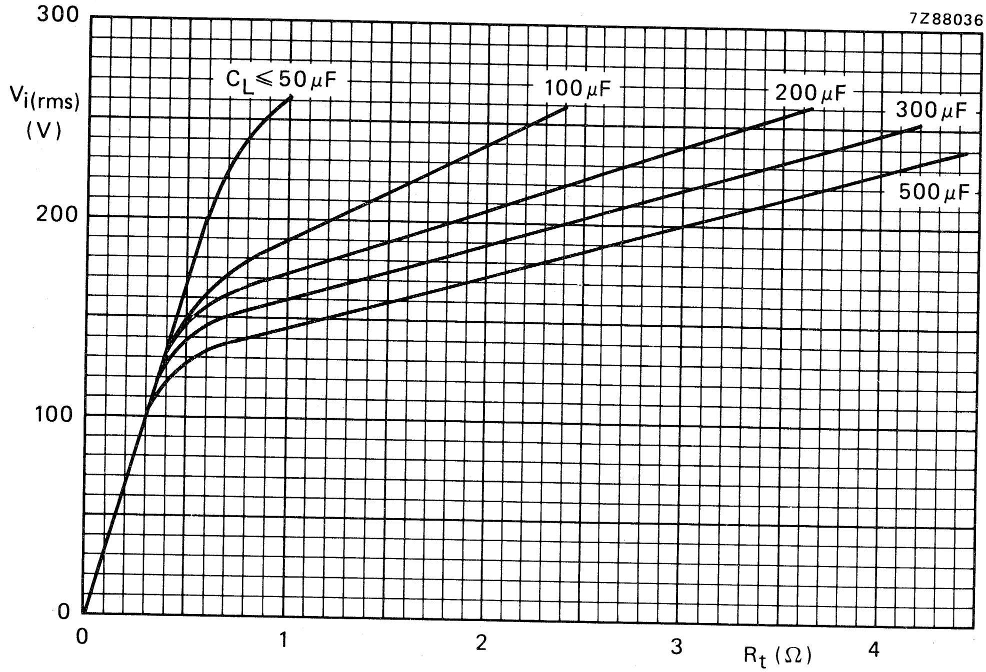


Fig. 7 Minimum values of series resistance (R_t), including the transformer resistance, required to limit the initial peak rectifier current with capacitive load. The possibility of the following spreads are taken into account: mains voltage + 10%; capacitance + 50%, resistance −10%.

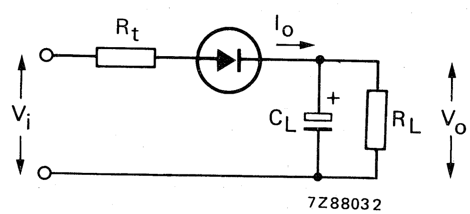


Fig. 8 Test circuit series resistance (R_t).

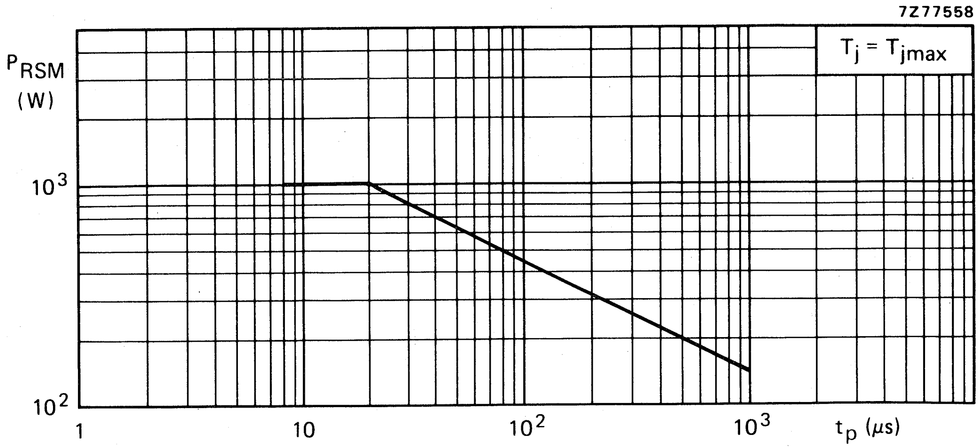
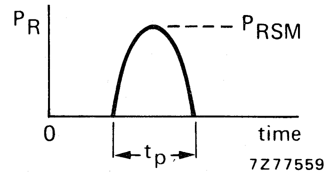


Fig. 9 Maximum permissible non-repetitive peak reverse power dissipation in the avalanche region.



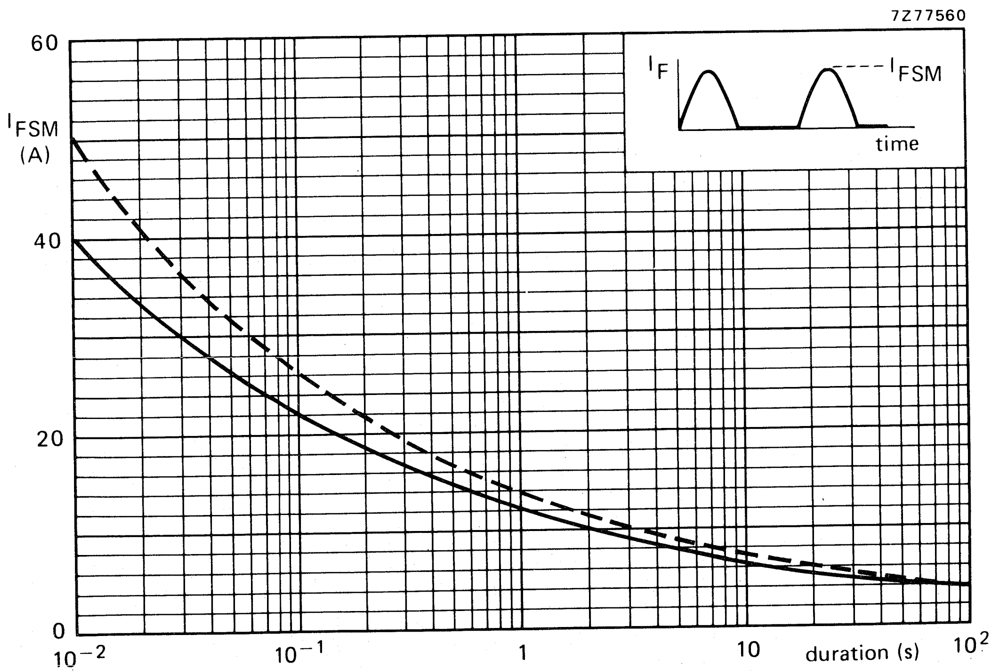


Fig. 10 Maximum permissible non-repetitive peak forward current based on sinusoidal currents (f = 50 Hz).

– – – T_j = 25 °C; $V_R = 0$

—— $T_j = T_{j\,max}$ prior to surge, $V_R = V_{RWMmax}$.

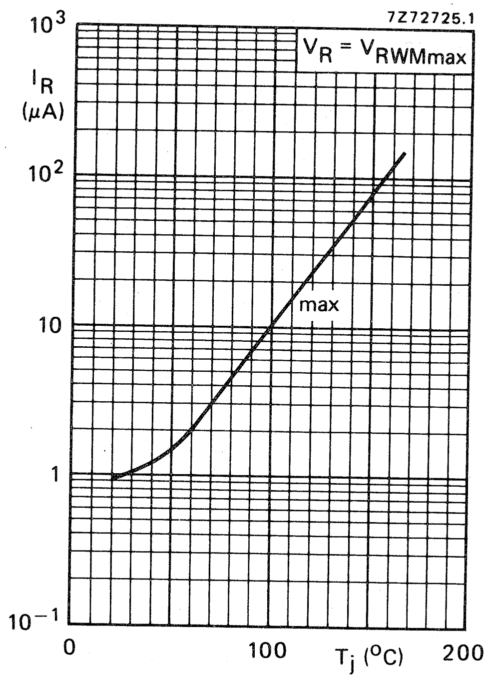


Fig. 11.

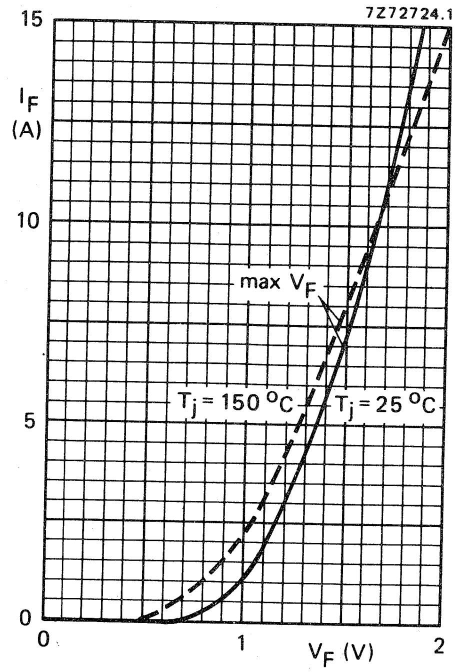


Fig. 12.

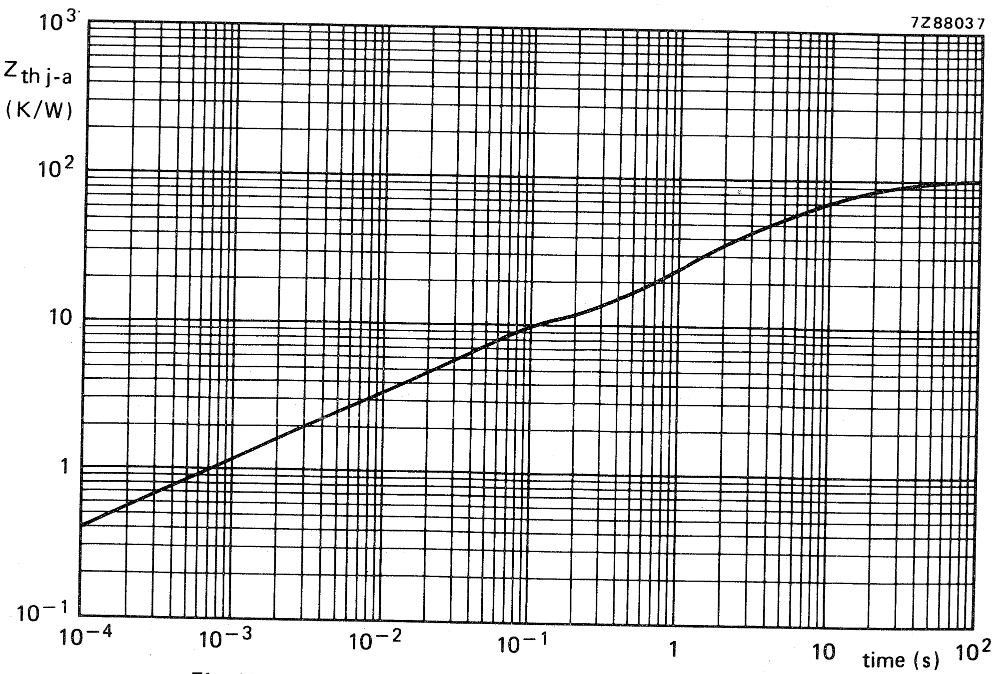


Fig. 13 Device mounted on a printed circuit board (see Fig. 2).

VOLTAGE REGULATOR DIODES

Silicon planar diodes in a DO-35 envelope intended for use as low-power voltage stabilizers or voltage references.
The series consists of 43 types with nominal working voltages ranging from 3,0 V to 75 V.

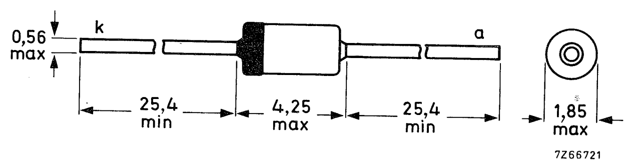
QUICK REFERENCE DATA

Working voltage range	V_Z	nom.	3,0 to 75	V
Working voltage tolerance			± 5	%
Total power dissipation	P_{tot}	max.	500	mW
Non-repetitive peak reverse power dissipation T_j = 55 °C; t_p = 8,3 ms, square wave	P_{ZSM}	max.	10	W
Junction temperature	T_j		−65 to + 200	°C

MECHANICAL DATA

Dimensions in mm

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



Cathode indicated by coloured band.
The diodes are type-branded.

RATINGS

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

Average forward current (averaged over any 20 ms period)	$I_{F(AV)}$	max.	250 mA
Repetitive peak forward current	I_{FRM}	max.	250 mA
Total power dissipation if leads are kept at T_{lead} = 75 °C at 8 mm from body	P_{tot}	max.	500 mW
Derating factor			4 mW/K
Non-repetitive peak reverse power dissipation T_j = 55 °C; t_p = 8,3 ms, square wave	P_{ZSM}	max.	10 W
Storage temperature	T_{stg}		−65 to + 200 °C
Junction temperature	T_j		−65 to + 200 °C

CHARACTERISTICS

T_{amb} = 25 °C unless otherwise stated

Forward voltage I_F = 200 mA	V_F	max.	1,1 V

type number	working voltage V_Z (V) at I_{ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0,25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) max.
1N5225B	3,0	20	29	1600	50	1,0	−0,075
1N5226B	3,3	20	28	1600	25	1,0	−0,070
1N5227B	3,6	20	24	1700	15	1,0	−0,065
1N5228B	3,9	20	23	1900	10	1,0	−0,060
1N5229B	4,3	20	22	2000	5	1,0	± 0,055
1N5230B	4,7	20	19	1900	5	2,0	± 0,030
1N5231B	5,1	20	17	1600	5	2,0	± 0,030
1N5232B	5,6	20	11	1600	5	3,0	+ 0,038
1N5233B	6,0	20	7	1600	5	3,5	+ 0,038
1N5234B	6,2	20	7	1000	5	4,0	+ 0,045
1N5235B	6,8	20	5	750	3	5,0	+ 0,050
1N5236B	7,5	20	6	500	3	6,0	+ 0,058
1N5237B	8,2	20	8	500	3	6,5	+ 0,062
1N5238B	8,7	20	8	600	3	6,5	+ 0,065
1N5239B	9,1	20	10	600	3	7,0	+ 0,068

type number	working voltage V_Z (V) at I_{ztest} (note 1) nom.	test current I_{Ztest} (mA)	max. Zener impedance Z_{ZT} (Ω) at I_{Ztest} (note 2)	differential resistance r_{diff} (Ω) at I_{ZK} = 0,25 mA (note 2) max.	reverse current I_R (μA) at V_R max.	test voltage V_R (V)	temp. coeff. S_Z (%/K) (note 3) max.
1N5240B	10	20	17	600	3	8,0	+ 0,075
1N5241B	11	20	22	600	2	8,4	+ 0,076
1N5242B	12	20	30	600	1	9,1	+ 0,077
1N5243B	13	9,5	13	600	0,5	9,9	+ 0,079
1N5244B	14	9,0	15	600	0,1	10	+ 0,082
1N5245B	15	8,5	16	600	0,1	11	+ 0,082
1N5246B	16	7,8	17	600	0,1	12	+ 0,083
1N5247B	17	7,4	19	600	0,1	13	+ 0,084
1N5248B	18	7,0	21	600	0,1	14	+ 0,085
1N5249B	19	6,6	23	600	0,1	14	+ 0,086
1N5250B	20	6,2	25	600	0,1	15	+ 0,086
1N5251B	22	5,6	29	600	0,1	17	+ 0,087
1N5252B	24	5,2	33	600	0,1	18	+ 0,088
1N5253B	25	5,0	35	600	0,1	19	+ 0,089
1N5254B	27	4,6	41	600	0,1	21	+ 0,090
1N5255B	28	4,5	44	600	0,1	21	+ 0,091
1N5256B	30	4,2	49	600	0,1	23	+ 0,091
1N5257B	33	3,8	58	700	0,1	25	+ 0,092
1N5258B	36	3,4	70	700	0,1	27	+ 0,093
1N5259B	39	3,2	80	800	0,1	30	+ 0,094
1N5260B	43	3,0	93	900	0,1	33	+ 0,095
1N5261B	47	2,7	105	1000	0,1	36	+ 0,095
1N5262B	51	2,5	125	1100	0,1	39	+ 0,096
1N5263B	56	2,2	150	1300	0,1	43	+ 0,096
1N5264B	60	2,1	170	1400	0,1	46	+ 0,097
1N5265B	62	2,0	185	1400	0,1	47	+ 0,097
1N5266B	68	1,8	230	1600	0,1	52	+ 0,097
1N5267B	75	1,7	270	1700	0,1	56	+ 0,098

Notes

1. V_Z is measured with device at thermal equilibrium while held in clips at 10 mm from body in still air at 25 °C.
2. $I_{(ac\ rms)}$ = 10% of I_{Ztest} resp. I_{ZK}, 60 Hz superimposed.
3. For types 1N5225B to 1N5242B the current I_Z = 7,5 mA; for 1N5243B and higher $I_Z = I_{Ztest}$. Testpoints at T_1 = 25 °C, T_2 = 125 °C.

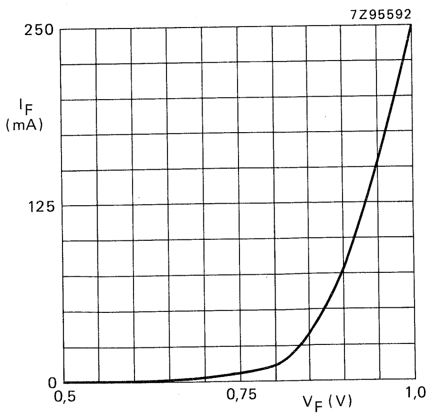


Fig. 2 T_{amb} = 25 °C; typical values.

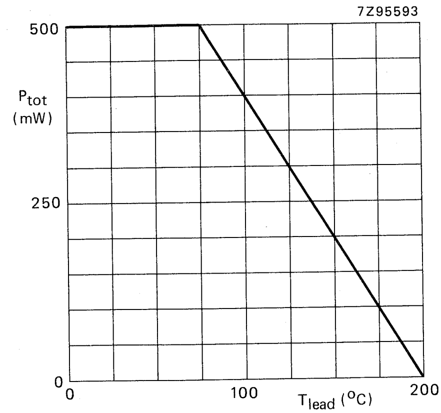


Fig. 3 Total power dissipation versus lead temperature.

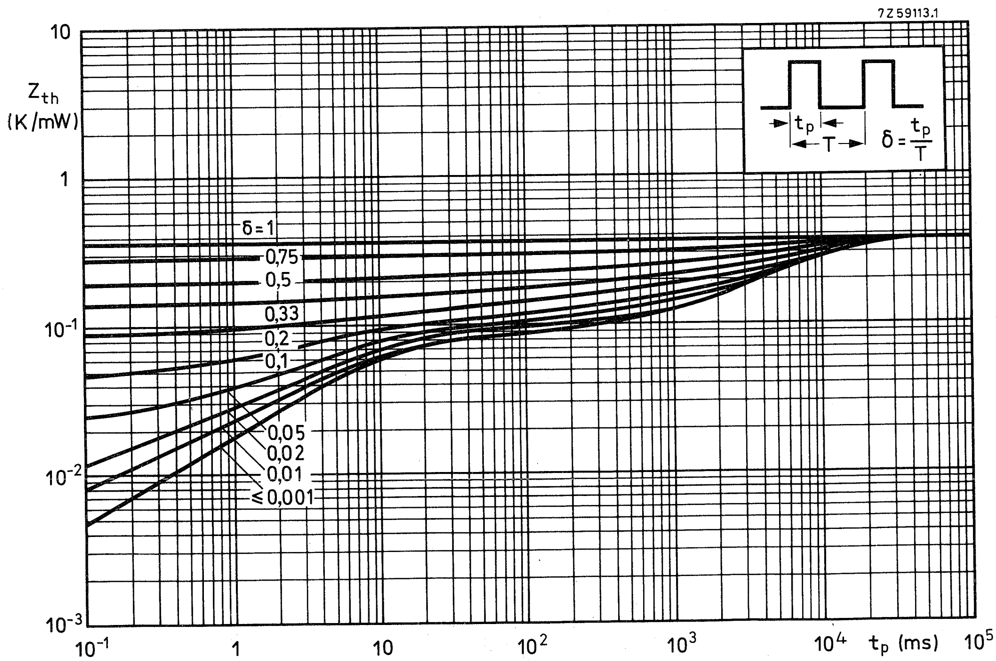


Fig. 4 Thermal impedance versus pulse duration.

Philips Components

Data sheet	
status	Preliminary specification
date of issue	February 1990

1N5817/1N5818/1N5819
Schottky barrier diodes

DESCRIPTION

Schottky barrier diodes in hermetically sealed SOD81 ID (note 1) envelope, intended for use in low output voltage, low power switched-mode power supplies and high-frequency circuits in general, where low conduction and switching losses are important.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	TYPE	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	1N5817 1N5818 1N5819	20 30 40	V V V
V_{RWM}	crest working reverse voltage	1N5817 1N5818 1N5819	20 30 40	V V V
V_R	continuous reverse voltage	1N5817 1N5818 1N5819	20 30 40	V V V
V_{RSM}	non-repetitive peak reverse voltage	1N5817 1N5818 1N5819	24 36 48	V V V
$I_{F(AV)}$	average forward current	1N5817 1N5818 1N5819	1 1 1	A A A
I_{FSM}	non repetitive peak forward current	1N5817 1N5818 1N5819	25 25 25	A A A
T_j	junction temperature	1N5817 1N5818 1N5819	125 125 125	°C °C °C

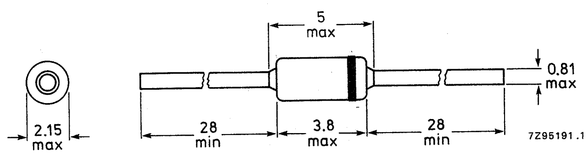
Note

1. Implosion diode

Schottky barrier diodes 1N5817/1N5818/1N5819

MECHANICAL DATA

Dimensions in mm



The marking band indicates the cathode.

Fig.1 SOD81.

LIMITING VALUES

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

SYMBOL	PARAMETER	TYPE	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	1N5817 1N5818 1N5819		- - -	20 30 40	V V V
V_{RWM}	crest working reverse voltage	1N5817 1N5818 1N5819		- - -	20 30 40	V V V
V_R	continious reverse voltage	1N5817 1N5818 1N5819		- - -	20 30 40	V V V
V_{RSM}	non-repetitive peak reverse voltage	1N5817 1N5818 1N5819		- - -	24 36 48	V V V
$I_{F(AV)}$	average forward current	1N5817 1N5818 1N5819	$V_{R(equiv)} \leq 0.2\ V_R(DC)$; T_{amb} = 55 °C; $R_{th\ j\text{-}a}$ = 100 K/W, pcb mounting (see Fig.2)	- - -	1 1 1	A A A
I_{FSM}	non-repetitive peak forward current	1N5817 1N5818 1N5819	t = 8.3 ms half-sine wave; $T_j = T_{j\ max}$ prior to surge; $V_R = 0$	- - -	25 25 25	A A A
T_{stg}	storage temperature range	1N5817 1N5818 1N5819		− 65 − 65 − 65	+175 +175 +175	°C °C °C
T_j	junction temperature	1N5817 1N5818 1N5819		- - -	125 125 125	°C °C °C

THERMAL RESISTANCE

Influence of mounting method

SYMBOL	PARAMETER	TYPE	NOM.	UNIT
$R_{th\ j\text{-}tp}$	thermal resistance from junction to tie-point at a lead length of 10 mm	1N5817 1N5818 1N5819	60 60 60	K/W K/W K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient; device mounted on a 1.5 mm thick epoxy-glass printed-circuit board with 3 cm^2 Cu-surface to each terminal; lead length 1/2" (see Fig.2)	1N5817 1N5818 1N5819	100 100 100	K/W K/W K/W

Schottky barrier diodes

1N5817/1N5818/1N5819

Dimensions in mm

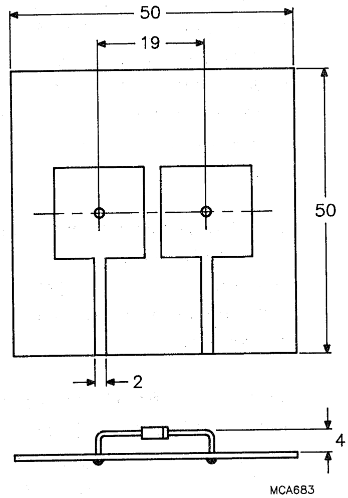


Fig.2 Method of mounting.

CHARACTERISTICS

T_j = 25 °C unless otherwise specified

SYMBOL	PARAMETER	TYPE	CONDITIONS	TYP.	MAX.	UNIT
V_F	forward voltage	1N5817	I_F = 0.1 A I_F = 1 A I_F = 3 A	- - -	320 450 750	mV mV mV
		1N5818	I_F = 0.1 A I_F = 1 A I_F = 3 A	- - -	330 550 875	mV mV mV
		1N5819	I_F = 0.1 A I_F = 1 A I_F = 3 A	- - -	340 600 900	mV mV mV
I_R	reverse current	All	$V_R = V_{RRMmax}$; $V_R = V_{RRMmax}$; T_j = 100 °C	- -	1 10	mA mA
C_d	diode capacitance	1N5817 1N5818 1N5819	V_R = 4 V; f = 1 MHz	80 50 50	- - -	pF pF pF

OPERATING NOTE

Calculation of $I_{F(AV)}$ rating

For Schottky barrier diodes thermal runaway has to be considered, as in some applications the reverse power losses are a significant part of the total power losses. For that reason the starting point for the calculation of the $I_{F(AV)}$ rating should be the maximum permissible junction temperature T_{jmax}.

Method of calculation

1. Input: type
   V_{RWM} and its duty cycle δ
   T_{amb}
   $a = I_{F(RMS)}/I_{F(AV)}$

2. Determine the maximum permissible junction temperature T_{jmax} (125 °C or the temperature at which thermal runaway occurs, whichever is lowest) from Figs 7, 9 or 11.

3. Determine the reverse power losses P_R from Figs 8, 10 or 12 and multiply P_R by 100 K/W, giving a certain number of degrees centigrade (this being the increase of junction temperature caused by reverse power dissipation).

4. Calculate T_R by subtracting the calculated number of degrees centigrade (15 °C or less) from the maximum permissible junction temperature.

5. Subtract T_{amb} from T_R (giving the admissible increase of junction temperature caused by forward dissipation) and calculate the admissible forward power dissipation using the formula:
   $P_F = (T_R - T_{amb})/R_{th\ j-a}$

6. Determine the $I_{F(AV)}$ rating from Figs 4, 5 or 6.

Example: 1N5818; V_{RWM} = 22 V;
δ = 0.5; T_{amb} = 60 °C;
a = 1.42

– find T_{jmax} from Fig.9 : 109 °C

– find P_R from Fig.10 : 0.15 W;
$P_R \times R_{thj-a}$ = 0.15 x 100 = 15 °C

– calculate T_R :
109 - 15 = 94 °C

– calculate P_F :
(94 - 60)/100 = 0.34 W

– find $I_{F(AV)max}$ from Fig.5, for a = 1.42 : $I_{F(AV)max}$ = 0.6 A.

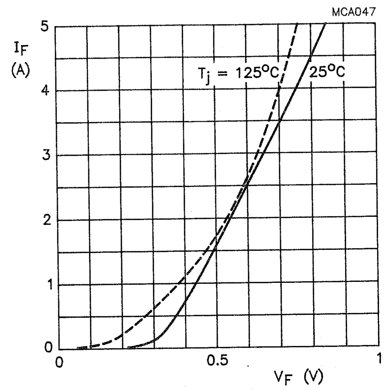


Fig.3 1N5817; 18; 19 Typical forward voltage.

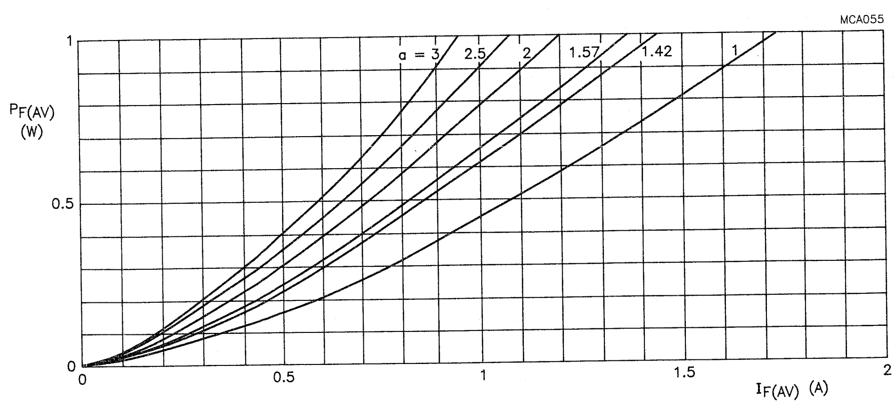


Fig.4 1N5817. Maximum values steady state forward power dissipation as a function of the average forward current; $a = I_{F(RMS)}/I_{F(AV)}$.

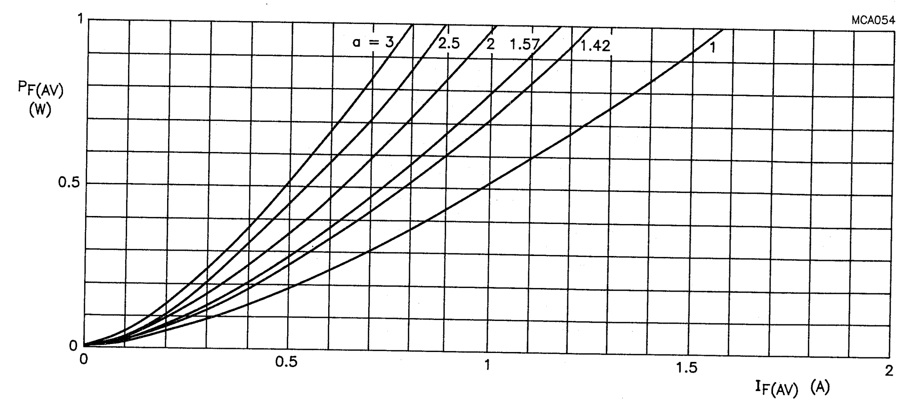


Fig.5 1N5818. Maximum values steady state forward power dissipation as a function of the average forward current; a = $I_{F(RMS)}/I_{F(AV)}$.

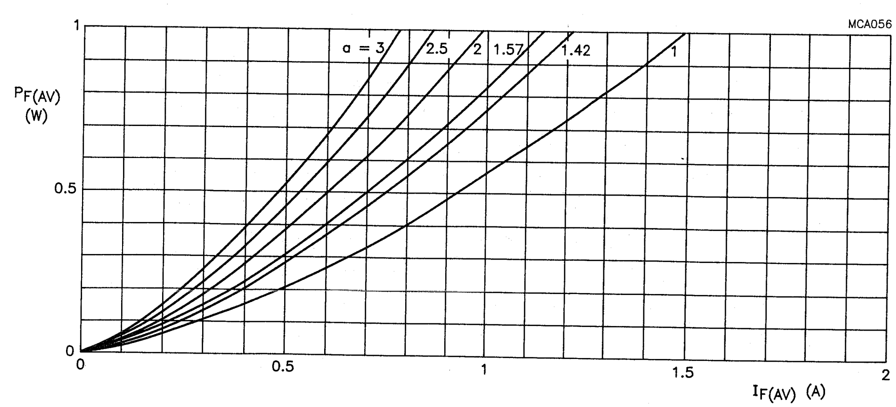


Fig.6 1N5819. Maximum values steady state forward power dissipation as a function of the average forward current; a = $I_{F(RMS)}/I_{F(AV)}$.

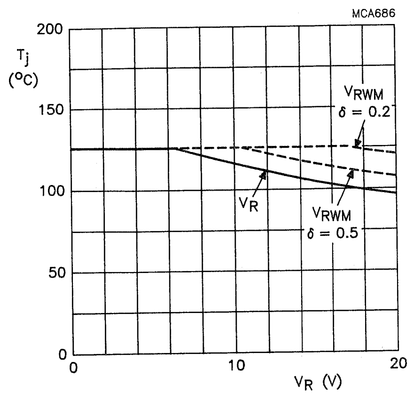


Fig.7 1N5817 Maximum permissible junction temperature as a function of reverse voltage; $R_{th\ j\text{-}a}$ = 100 K/W.

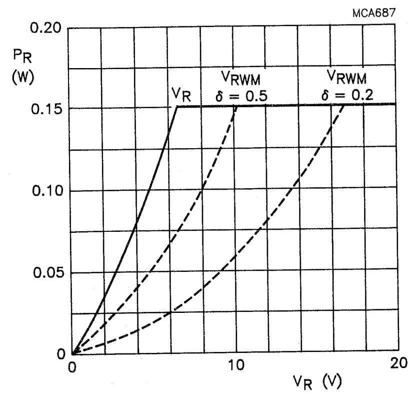


Fig.8 1N5817 Reverse power dissipation as a function of reverse voltage (max. values); $R_{th\ j\text{-}a}$ = 100 K/W.

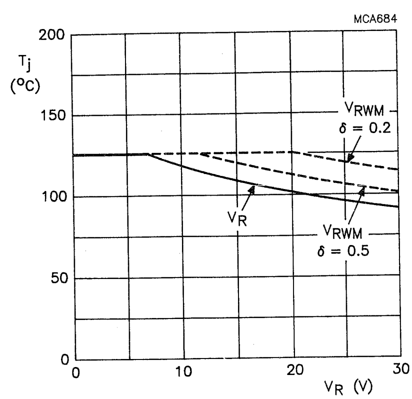


Fig.9 1N5818 Maximum permissible junction temperature as a function of reverse voltage; $R_{th\ j\text{-}a}$ = 100 K/W.

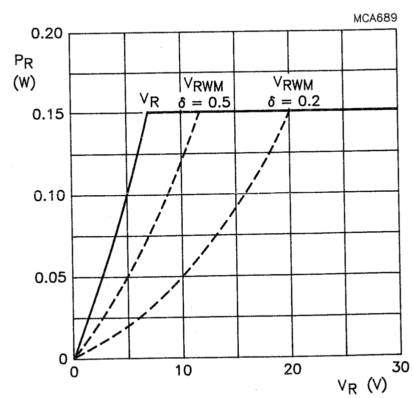


Fig.10 1N5818 Reverse power dissipation as a function of reverse voltage (max. values); $R_{th\ j\text{-}a}$ = 100 K/W.

Schottky barrier diodes

1N5817/1N5818/1N5819

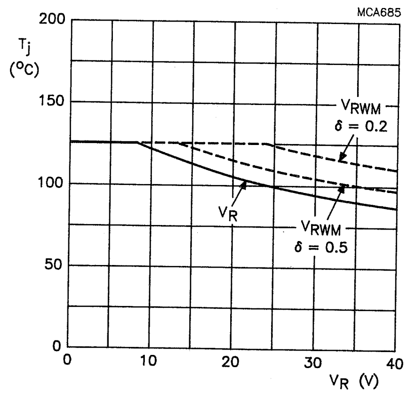


Fig.11 1N5819 Maximum permissible junction temperature as a function of reverse voltage; $R_{th\ j\text{-}a}$ = 100 K/W.

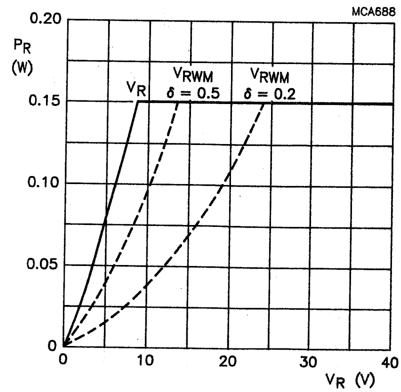


Fig.12 1N5819 Reverse power dissipation as a function of reverse voltage (max. values); $R_{th\ j\text{-}a}$ = 100 K/W.

Controlled avalanche Schottky barrier diodes

1N5820ID/21ID/22ID

DESCRIPTION

Schottky barrier diodes in hermetically sealed SOD84A Implosion Diode (ID) envelope, intended for use in low output voltage, low power switched-mode power supplies and high-frequency circuits in general, where low conduction and switching losses are important. The devices are capable of absorbing reverse surge current.

QUICK REFERENCE DATA

SYMBOL	PARAMETER	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage		
	1N5820	20	V
	1N5821	30	V
	1N5822	40	V
V_{RWM}	crest working reverse voltage		
	1N5820	20	V
	1N5821	30	V
	1N5822	40	V
V_R	continuous reverse voltage		
	1N5820	20	V
	1N5821	30	V
	1N5822	40	V
$I_{F(AV)}$	average forward current	3	A
I_{FSM}	non-repetitive peak forward current	80	A
T_j	junction temperature	125	°C

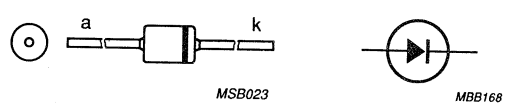


Fig.1 Simplified outline (SOD84A) and symbol.

LIMITING VALUES

In accordance with the Absolute Maximum System (IEC 134).

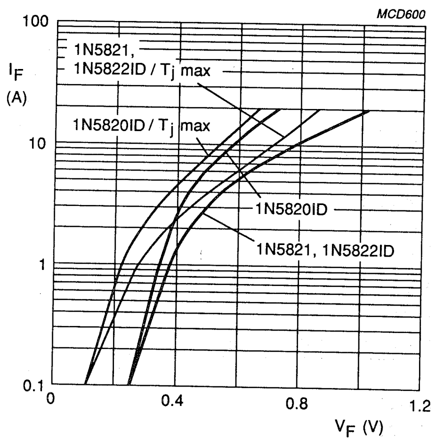
SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_R	continuous reverse voltage				
	1N5820		–	20	V
	1N5821		–	30	V
	1N5822		–	40	V
V_{RRM}	repetitive peak reverse voltage				
	1N5820		–	20	V
	1N5821		–	30	V
	1N5822		–	40	V
V_{RWM}	crest working reverse voltage				
	1N5820		–	20	V
	1N5821		–	30	V
	1N5822		–	40	V
$I_{F(AV)}$	average forward current	$V_{R(equiv)} = 0.2\ V_{R(DC)}$; $T_{amb} = 50$ °C; lead length 4 mm; $R_{th\ j\text{-}tp} = 28$ K/W	–	3	A
		$V_{R(equiv)} = 0.2\ V_{R(DC)}$; $T_{amb} = 60$ °C; PCB mounting; $R_{th\ j\text{-}a} = 68$ K/W (see Fig.5)	–	1.3	A
I_{FSM}	non-repetitive peak forward current	t = 8.3 ms; half sine-wave; JEDEC method	–	80	A
I_{RSM}	non-repetitive reverse surge current	$t_p = 100$ µs	–	0.5	A
T_{stg}	storage temperature range		–65	125	°C
T_j	junction temperature		–	125	°C
T_{amb}	ambient temperature	rated V_R; $P_F = 0$; $R_{th\ j\text{-}a} = 68$ K/W			
	1N5820		–	70	°C
	1N5821		–	65	°C
	1N5822		–	60	°C

THERMAL RESISTANCE

SYMBOL	PARAMETER	CONDITIONS	THERMAL RESISTANCE
$R_{th\ j\text{-}tp}$	from junction to tie-point	lead length 4 mm	28 K/W
$R_{th\ j\text{-}a}$	from junction to ambient	note 1	68 K/W

Note

1. Device mounted on a 1.5 mm thick epoxy-glass printed circuit board, with 3 cm^2 copper surface to each terminal; lead length 10 mm; see Fig.5.



T_j = 25 °C; $T_{j\ max}$ = 125 °C.

Fig.2 Forward current as a function of forward voltage, typical values.

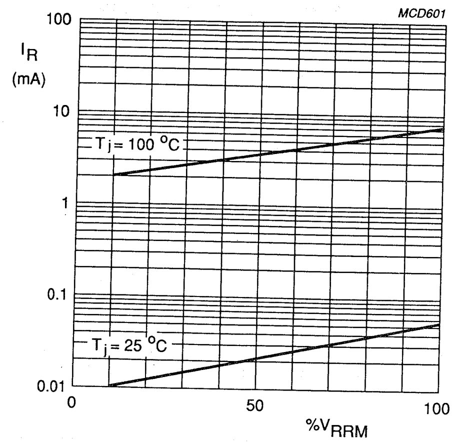


Fig.3 Reverse current as a function of repetitive peak reverse voltage, typical values.

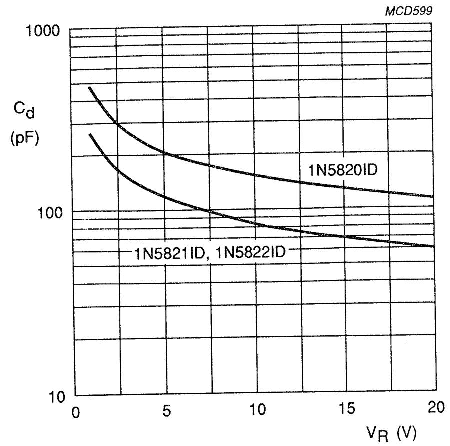
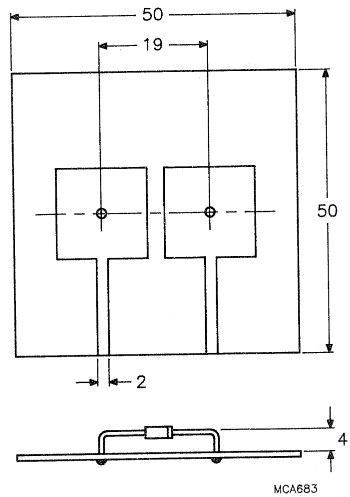


Fig.4 Diode capacitance as a function of reverse voltage, typical values.



Dimensions in mm.

Fig.5 Method of mounting.

CHARACTERISTICS

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage (note 1)	I_F = 1 A			
	1N5820		–	0.370	V
	1N5821		–	0.380	V
	1N5822		–	0.390	V
		I_F = 3 A			
	1N5820		–	0.475	V
	1N5821		–	0.500	V
	1N5822		–	0.525	V
		I_F = 9.4 A			
	1N5820		–	0.850	V
	1N5821		–	0.900	V
	1N5822		–	0.950	V
$V_{(BR)R}$	reverse breakdown voltage	I_R = 10 mA			
	1N5820		24	–	V
	1N5821		36	–	V
	1N5822		48	–	V
I_R	reverse current (note 1)	$V_R = V_{RRM\ max}$	–	2	mA
		$V_R = V_{RRM\ max}$; T_j = 100 °C	–	20	mA
C_d	diode capacitance	V_R = 4 V; f = 1 MHz			
	1N5820		–	250	pF
	1N5821		–	175	pF
	1N5822		–	175	pF

Note

1. Pulsed test: pulse width = 300 µs; δ = 0.02.

Controlled avalanche Schottky barrier diodes

1N5820ID/21ID/22ID

OPERATING NOTE

Calculation of $I_{F(AV)}$-rating

For Schottky barrier diodes, thermal runaway has to be considered, as in some applications the reverse power losses are a significant part of the total power losses. For that reason, the starting point for the calculation of the $I_{F(AV)}$-rating should be the determination of the reverse leakage dissipation P_R.

METHOD OF CALCULATION

1. Input:
   - V_{RWM} applied
   - voltage grade
   - duty cycle (for square wave operation) or
   - 'a' factor (for sinusoidal operation)
   - $R_{th\ j\text{-}a}$
   - T_{amb}.
2. Determine the reverse power losses P_R from Fig.6 or 7, for a chosen V_{RWM}, maximum permissible junction temperature $T_{j\ max}$, voltage grade and 'a' factor.
3. Multiply P_R by $R_{th\ j\text{-}a}$, giving a certain number of degrees centigrade.
4. Check thermal stability: $P_R \times R_{th\ j\text{-}a}$ should be less than 15 °C; if this is more than 15 °C then determine P_R again for a lower maximum permissible junction temperature, until the condition for the thermal stability is fulfilled.
5. Calculate T_R by subtracting the calculated number of degrees centigrade (15 °C or less) from the maximum permissible junction temperature.
6. Subtract T_{amb} from T_R (giving the admissible increase of junction temperature caused by forward dissipation) and calculate the admissible forward dissipation using the formula:

   $P_F = (T_R - T_{amb})/R_{th\ j\text{-}a}$.
7. Determine the $I_{F(AV)}$-rating from Fig.8 or 9.

   Example: 1N5821; V_{RWM} = 22 V; square wave operation with 'a' = 1.41; $R_{th\ j\text{-}a}$ = 68 K/W; T_{amb} = 60 °C

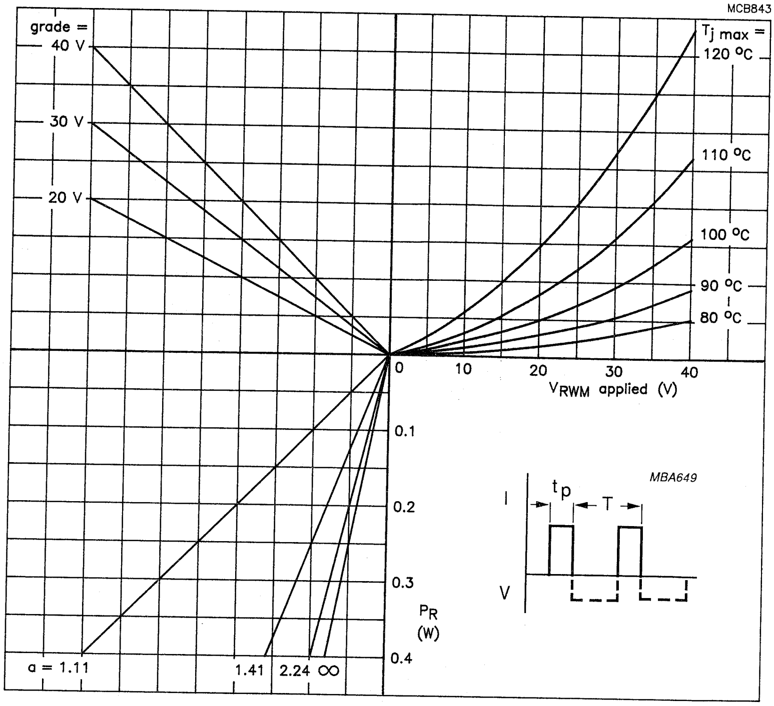
   Find P_R, for a supposed $T_{j\ max}$ of 100 °C, from Fig.6: 0.19 W

   $P_R \times R_{th\ j\text{-}a}$ = 0.19 x 69 = 12.9 °C (so a thermal stable situation)

   Calculate $T_{R\ max}$: 100 - 12.9 = 87.1 °C

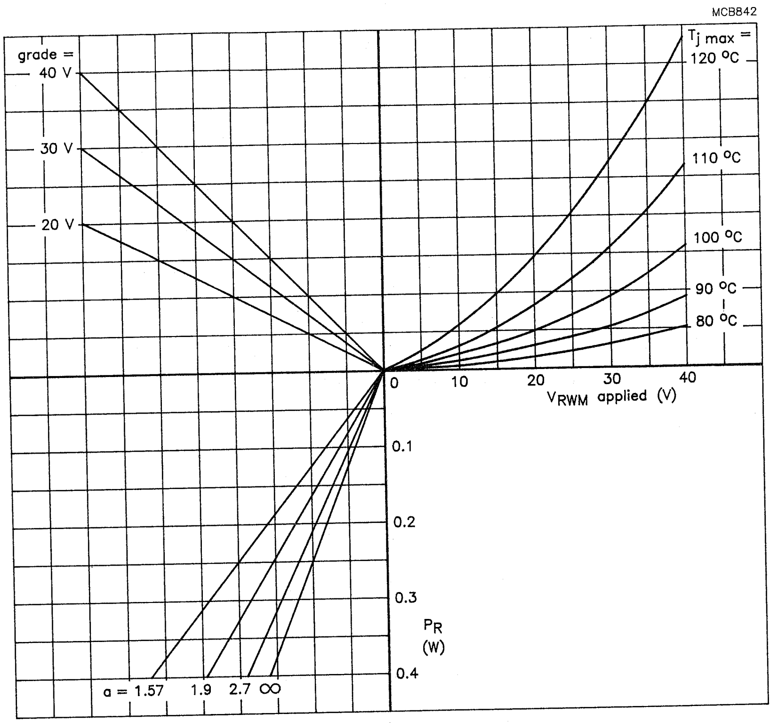
   Calculate $P_{F\ max}$: (87.1 - 60)/68 = 0.4 W

   Find $I_{F(AV)\ max}$ from Fig.9, for 'a' = 1.41 : $I_{F(AV)\ max}$ = 1 A



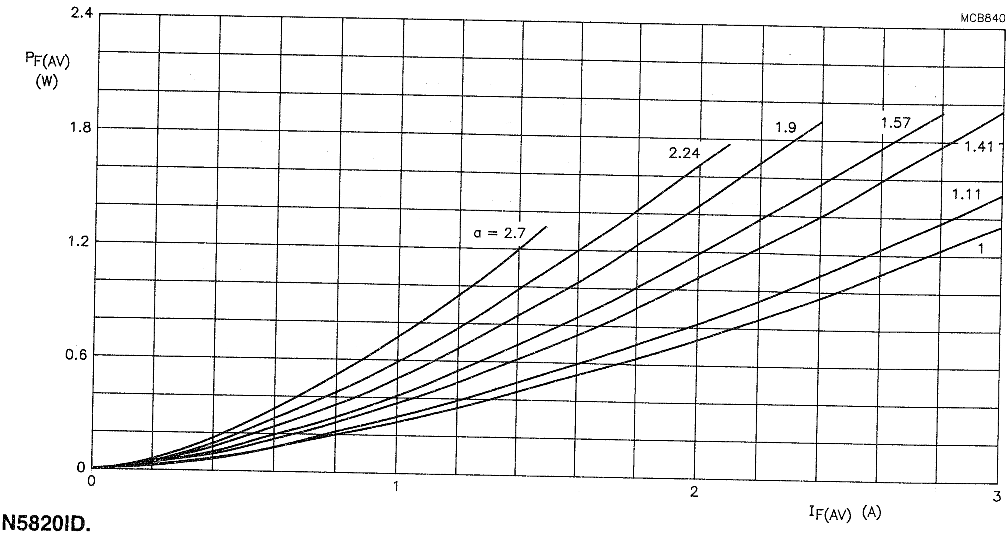
'a' = form factor = $\sqrt{T/t_p}$.

Fig.6 Nomogram for calculation of reverse leakage power dissipation (P_R) for given values of $T_{j\ max}$, V_{RWM} applied, voltage grade and form factor; square wave operation.



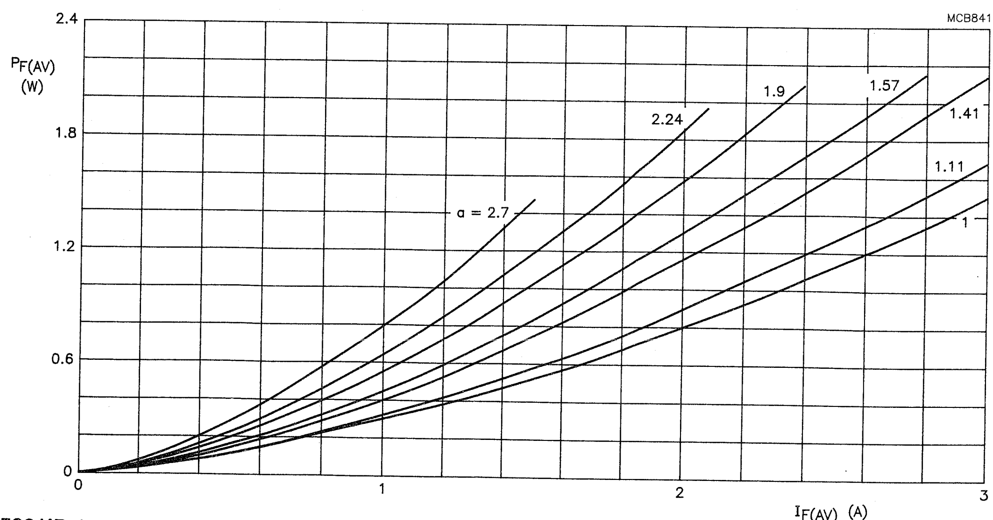
'a' = form factor = $I_{F(RMS)}/I_{F(AV)}$.

Fig.7 Nomogram for calculation of reverse leakage power dissipation (P_R) for given values of $T_{j\ max}$, V_{RWM} applied, voltage grade and form factor; sinusoidal wave operation (RC load).



1N5820ID.

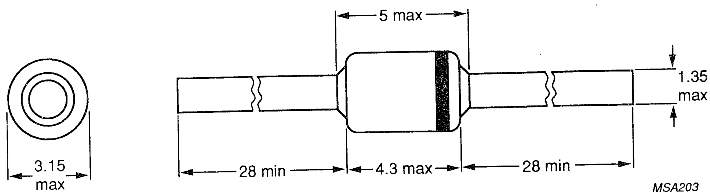
Fig.8 Forward current power losses.



1N5821ID & 1N5822ID.

Fig.9 Forward current power losses.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.10 SOD84A.

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