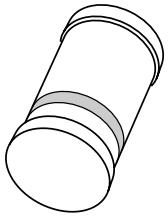
DATA SHEET



BZD27 series
Voltage regulator diodes

Product specification
Supersedes data of October 1991

1996 Jun 10

Philips
Semiconductors

PHILIPS

Voltage regulator diodes BZD27 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Zener working voltage range: 3.6 to 270 V for 46 types
- Transient suppressor stand-off voltage range: 6.2 to 430 V for 45 types
- Supplied in 8 mm embossed tape.

DESCRIPTION

Cavity free cylindrical glass SOD87 package through Implotec™(1) technology. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

(1) Implotec is a trademark of Philips.

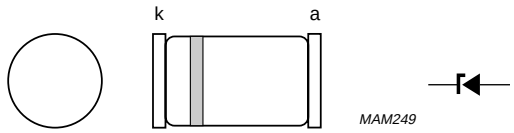


Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
P_{tot}	total power dissipation	T_{tp} = 105 °C; see Figs 2 and 3			
	BZD27-C3V6 to -C6V8		–	1.7	W
	BZD27-C7V5 to -C510		–	2.3	W
P_{tot}	total power dissipation	PCB mounted (see Fig.7)			
	BZD27-C3V6 to -C6V8	T_{amb} = 60 °C; see Fig.2	–	0.8	W
	BZD27-C7V5 to -C510	T_{amb} = 55 °C; see Fig.3	–	0.8	W
P_{ZSM}	non-repetitive peak reverse power dissipation	t_p = 100 µs; square pulse; T_j = 25 °C prior to surge; see Figs.4 and 5			
	BZD27-C3V6 to -C6V8		–	300	W
	BZD27-C7V5 to -C510		–	300	W
P_{RSM}	non-repetitive peak reverse power dissipation	10/1000 µs exponential pulse (see Fig.8); T_j = 25 °C prior to surge			
	BZD27-C7V5 to -C510		–	150	W
T_{stg}	storage temperature				
	BZD27-C3V6 to -C6V8		–65	+200	°C
	BZD27-C7V5 to -C510		–65	+175	°C
T_j	junction temperature				
	BZD27-C3V6 to -C6V8		–65	+200	°C
	BZD27-C7V5 to -C510		–65	+175	°C

ELECTRICAL CHARACTERISTICS

Total series

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	I_F = 0.2 A; see Fig.6	–	1.2	V

Per type when used as voltage regulator diodes

T_j = 25 °C unless otherwise specified.

TYPE No. SUFFIX (1)	WORKING VOLTAGE			DIFFERENTIAL RESISTANCE		TEMPERATURE COEFFICIENT		TEST CURRENT	REVERSE CURRENT at REVERSE VOLTAGE	
	V_Z (V) at I_Z			r_{dif} (Ω) at I_Z		S_Z (%/K) at I_Z		I_Z (mA)	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	5.0	3	7	–0.10	0.00	100	10	1
C5V1	4.8	5.1	5.4	3	6	–0.08	–0.02	100	5	1
C5V6	5.2	5.6	6.0	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	0.00	0.07	100	10	3
C7V5	7.0	7.5	7.9	1	2	0.00	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	4	8.2
C12	11.4	12	12.7	4	7	0.05	0.10	50	3	9.1
C13	12.4	13	14.1	5	10	0.05	0.10	50	2	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

TYPE No. SUFFIX (1)	WORKING VOLTAGE			DIFFERENTIAL RESISTANCE		TEMPERATURE COEFFICIENT		TEST CURRENT	REVERSE CURRENT at REVERSE VOLTAGE	
	V_Z (V) at I_Z			r_{dif} (Ω) at I_Z		S_Z (%/K) at I_Z		I_Z (mA)	I_R (μA)	V_R (V)
	MIN.	NOM.	MAX.	TYP.	MAX.	MIN.	MAX.		MAX.	
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

Note

1. To complete the type number the suffix is added to the basic type number, e.g. BZD27-C51.

Per type when used as transient suppressor diodes

T_j = 25 °C unless otherwise specified.

TYPE NUMBER	REVERSE BREAKDOWN VOLTAGE	TEMPERATURE COEFFICIENT		TEST CURRENT	CLAMPING VOLTAGE		REVERSE CURRENT at STAND-OFF VOLTAGE	
	$V_{(BR)R}$ (V) at I_{test}	S_Z (%/K) at I_{test}		I_{test} (mA)	$V_{(CL)R}$ (V)	at I_{RSM} (A) note 1	I_R (μA)	at V_R (V)
	MIN.	MIN.	MAX.		MAX.		MAX.	
BZD27-C7V5	7.0	0.00	0.07	100	11.3	13.3	1500	6.2
BZD27-C8V2	7.7	0.03	0.08	100	12.3	12.2	1200	6.8
BZD27-C9V1	8.5	0.03	0.08	50	13.3	11.3	100	7.5
BZD27-C10	9.4	0.05	0.09	50	14.8	10.1	20	8.2
BZD27-C11	10.4	0.05	0.10	50	15.7	9.6	5	9.1
BZD27-C12	11.4	0.05	0.10	50	17.0	8.8	5	10
BZD27-C13	12.4	0.05	0.10	50	18.9	7.9	5	11
BZD27-C15	13.8	0.05	0.10	50	20.9	7.2	5	12
BZD27-C16	15.3	0.06	0.11	25	22.9	6.6	5	13
BZD27-C18	16.8	0.06	0.11	25	25.6	5.9	5	15
BZD27-C20	18.8	0.06	0.11	25	28.4	5.3	5	16
BZD27-C22	20.8	0.06	0.11	25	31.0	4.8	5	18
BZD27-C24	22.8	0.06	0.11	25	33.8	4.4	5	20
BZD27-C27	25.1	0.06	0.11	25	38.1	3.9	5	22
BZD27-C30	28	0.06	0.11	25	42.2	3.6	5	24
BZD27-C33	31	0.06	0.11	25	46.2	3.2	5	27
BZD27-C36	34	0.06	0.11	10	50.1	3.0	5	30
BZD27-C39	37	0.06	0.11	10	54.1	2.8	5	33
BZD27-C43	40	0.07	0.12	10	60.7	2.5	5	36
BZD27-C47	44	0.07	0.12	10	65.5	2.3	5	39
BZD27-C51	48	0.07	0.12	10	70.8	2.1	5	43
BZD27-C56	52	0.07	0.12	10	78.6	1.9	5	47
BZD27-C62	58	0.08	0.13	10	86.5	1.7	5	51
BZD27-C68	64	0.08	0.13	10	94.4	1.6	5	56
BZD27-C75	70	0.08	0.13	10	103.5	1.5	5	62
BZD27-C82	77	0.08	0.13	10	114	1.3	5	68
BZD27-C91	85	0.09	0.13	5	126	1.2	5	75
BZD27-C100	94	0.09	0.13	5	139	1.1	5	82
BZD27-C110	104	0.09	0.13	5	152	1.0	5	91
BZD27-C120	114	0.09	0.13	5	167	0.90	5	100
BZD27-C130	124	0.09	0.13	5	185	0.81	5	110
BZD27-C150	138	0.09	0.13	5	204	0.73	5	120
BZD27-C160	153	0.09	0.13	5	224	0.67	5	130

TYPE NUMBER	REVERSE BREAKDOWN VOLTAGE	TEMPERATURE COEFFICIENT		TEST CURRENT	CLAMPING VOLTAGE		REVERSE CURRENT at STAND-OFF VOLTAGE	
	$V_{(BR)R}$ (V) at I_{test}	S_Z (%/K) at I_{test}		I_{test} (mA)	$V_{(CL)R}$ (V)	at I_{RSM} (A) note 1	I_R (μA)	at V_R (V)
	MIN.	MIN.	MAX.		MAX.		MAX.	
BZD27-C180	168	0.09	0.13	5	249	0.60	5	150
BZD27-C200	188	0.09	0.13	5	276	0.54	5	160
BZD27-C220	208	0.09	0.13	2	305	0.50	5	180
BZD27-C240	228	0.09	0.13	2	336	0.45	5	200
BZD27-C270	251	0.09	0.13	2	380	0.40	5	220
BZD27-C300	280	0.09	0.13	2	419	0.36	5	240
BZD27-C330	310	0.09	0.13	2	459	0.33	5	270
BZD27-C360	340	0.09	0.13	2	498	0.30	5	300
BZD27-C390	370	0.09	0.13	2	537	0.28	5	330
BZD27-C430	400	0.09	0.13	2	603	0.25	5	360
BZD27-C470	440	0.09	0.13	2	655	0.23	5	390
BZD27-C510	480	0.09	0.13	2	707	0.21	5	430

Note

1. Non-repetitive peak reverse current in accordance with *"IEC 60-1, Section 8"* (10/1000 μs pulse); see Fig.8.

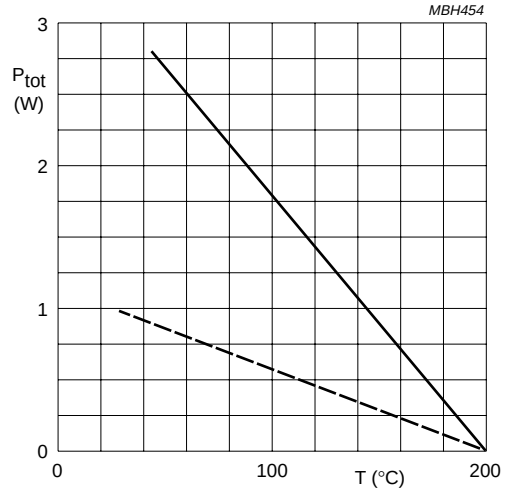
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}tp}$	thermal resistance from junction to tie-point			
	BZD27-C3V6 to -C6V8		55	K/W
	BZD27-C7V5 to -C510		30	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1		
	BZD27-C3V6 to -C6V8		175	K/W
	BZD27-C7V5 to -C510		150	K/W

Note

1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 μm, see Fig.7. For more information please refer to the *"General Part of associated Handbook"*.

GRAPHICAL DATA

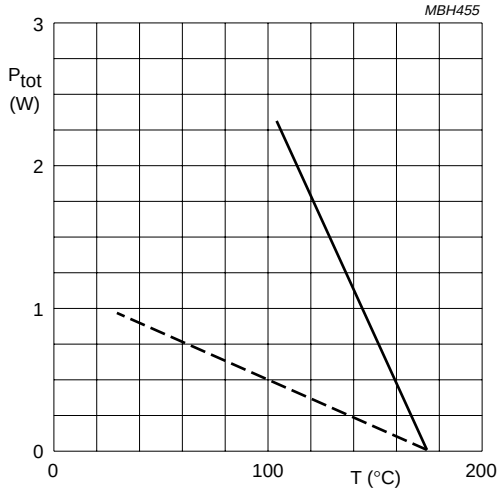


Types BZD27-C3V6 to -C6V8

Solid line: tie-point temperature.

Dotted line: ambient temperature; device mounted as shown in Fig.7.

Fig.2 Maximum total power dissipation as a function of temperature.

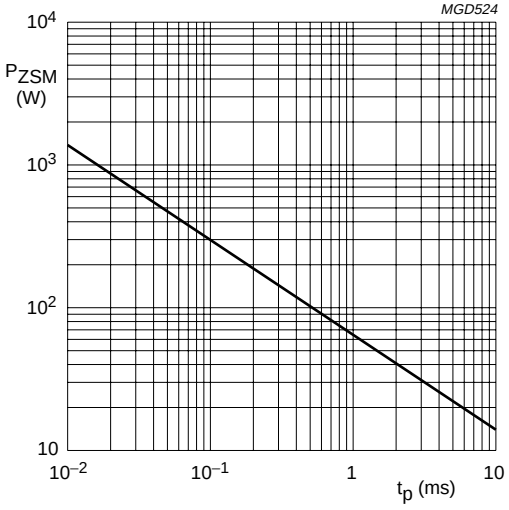


Types BZD27-C7V5 to -C510

Solid line: tie-point temperature.

Dotted line: ambient temperature; device mounted as shown in Fig.7.

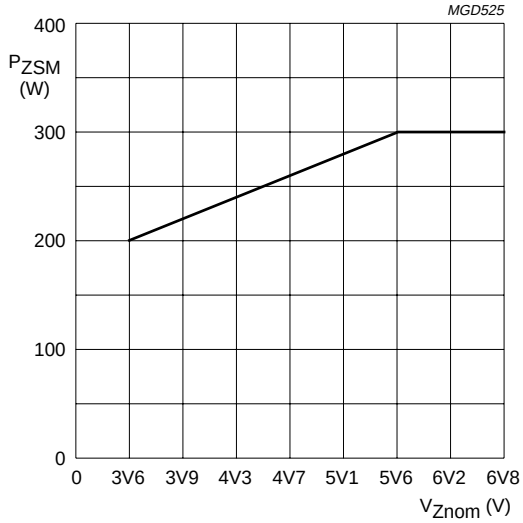
Fig.3 Maximum total power dissipation as a function of temperature.



T_j = 25 °C prior to surge.

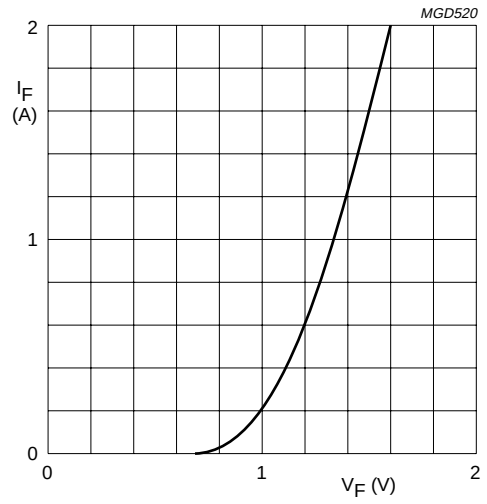
See also Fig 5.

Fig.4 Maximum non-repetitive peak reverse power dissipation as a function of pulse duration (square pulse).



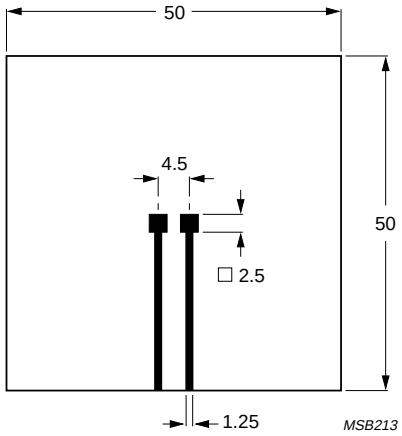
T_j = 25 °C prior to surge.

Fig.5 Maximum non-repetitive peak reverse power dissipation as a function of nominal working voltage.



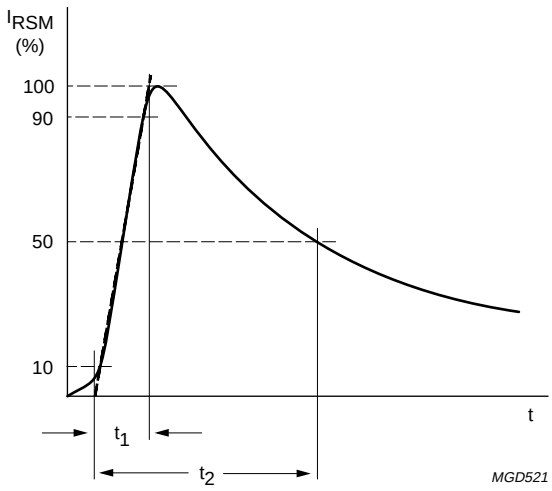
T_j = 25 °C.

Fig.6 Forward current as a function of forward voltage; typical values.



Dimensions in mm.

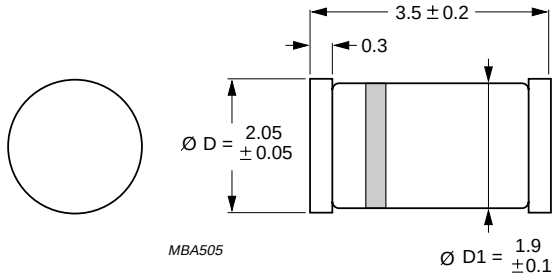
Fig.7 Printed-circuit board for surface mounting.



In accordance with *"IEC 60-1, Section 8"*.
t_1 = 10 µs.
t_2 = 1000 µs.

Fig.8 Non-repetitive peak reverse current pulse definition.

PACKAGE OUTLINE



Dimensions in mm.

The marking band indicates the cathode.

Fig.9 SOD87.

DEFINITIONS

Data sheet status	
Objective specification	This data sheet contains target or goal specifications for product development.
Preliminary specification	This data sheet contains preliminary data; supplementary data may be published later.
Product specification	This data sheet contains final product specifications.
Limiting values	
Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability.	
Application information	
Where application information is given, it is advisory and does not form part of the specification.	

LIFE SUPPORT APPLICATIONS

These products are not designed for use in life support appliances, devices, or systems where malfunction of these products can reasonably be expected to result in personal injury. Philips customers using or selling these products for use in such applications do so at their own risk and agree to fully indemnify Philips for any damages resulting from such improper use or sale.

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微波光电部专业代理经销高频、微波、光纤、光电元器件、组件、部件、模块、整机；电磁兼容元器件、材料、设备；微波 CAD、EDA 软件、开发测试仿真工具；微波、光纤仪器仪表。欢迎国外高科技微波、光纤厂商将优秀产品介绍到中国、共同开拓市场。长期大量现货专业批发高频、微波、卫星、光纤、电视、CATV 器件： 晶振、VCO、连接器、PIN 开关、变容二极管、开关二极管、低噪晶体管、功率电阻及电容、放大器、功率管、MMIC、混频器、耦合器、功分器、振荡器、合成器、衰减器、滤波器、隔离器、环行器、移相器、调制解调器；光电子元器件和组件：红外发射管、红外接收管、光电开关、光敏管、发光二极管和发光二极管组件、半导体激光二极管和激光器组件、光电探测器和光接收组件、光发射接收模块、光纤激光器和光放大器、光调制器、光开关、DWDM 用光发射和接收器件、用户接入系统光光收发器件与模块、光纤连接器、光纤跳线/尾纤、光衰减器、光纤适 配器、光隔离器、光耦合器、光环行器、光复用器/转换器；无线收发芯片和模组、蓝牙芯片和模组。

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