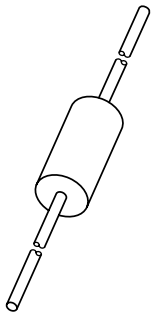
DATA SHEET



BY9300 series
Fast high-voltage soft-recovery controlled avalanche rectifiers

Product specification
Supersedes data of 1998 Jul 29

2000 Jan 10

Philips
Semiconductors

PHILIPS

Fast high-voltage soft-recovery controlled avalanche rectifiers

BY9300 series

FEATURES

- Plastic package
- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- 40% overvoltage allowed during 5 seconds
- Guaranteed avalanche energy absorption capability
- Very low reverse recovery time
- Soft-recovery switching characteristics
- Compact construction.

APPLICATIONS

- For colour television and monitors up to 32 kHz (indication)
- High-voltage applications for:
  - Multipliers
  - Diode-split-transformers (FBTs).

DESCRIPTION

Plastic package, using glass passivation and a high temperature alloyed construction.

This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

The package should be used in an insulating medium such as resin, oil or SF6 gas.

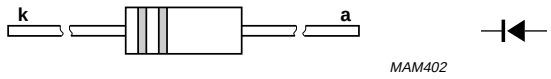


Fig.1 Simplified outline (SOD118A/B) and symbol.

MARKING

Cathode band colour codes.

TYPE NUMBER	PACKAGE CODE	OUTER BAND	INNER BAND
BY9304	SOD118A	white	–
BY9306	SOD118A	white	green
BY9308	SOD118A	white	red
BY9310	SOD118B	white	violet
BY9312	SOD118B	white	orange
BY9314	SOD118B	white	lilac
BY9316	SOD118B	white	grey
BY9318	SOD118B	white	brown

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM1}	repetitive peak reverse voltage				
	BY9304		–	4	kV
	BY9306		–	6	kV
	BY9308		–	8	kV
	BY9310		–	10	kV
	BY9312		–	12	kV
	BY9314		–	14	kV
	BY9316		–	16	kV
	BY9318		–	18	kV
V_{RRM2}	repetitive peak reverse voltage	max. 5 seconds			
	BY9304		–	5.6	kV
	BY9306		–	8.4	kV
	BY9308		–	11.2	kV
	BY9310		–	14.0	kV
	BY9312		–	16.8	kV
	BY9314		–	19.6	kV
	BY9316		–	22.4	kV
	BY9318		–	25.2	kV
V_{RSM}	non-repetitive peak reverse voltage				
	BY9304		–	5.6	kV
	BY9306		–	8.4	kV
	BY9308		–	11.2	kV
	BY9310		–	14.0	kV
	BY9312		–	16.8	kV
	BY9314		–	19.6	kV
	BY9316		–	22.4	kV
	BY9318		–	25.2	kV
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sinewave; $T_j = T_{j\,max}$ prior to surge	–	0.5	A
$I_{F(AV)}$	average forward current	averaged over any 20 ms period			
	BY9304		–	20	mA
	BY9306		–	10	mA
	BY9308		–	5	mA
	BY9310		–	5	mA
	BY9312		–	5	mA
	BY9314		–	5	mA
	BY9316		–	5	mA
	BY9318		–	5	mA
I_{FRM}	repetitive peak forward current	note 1	–	500	mA

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
T_{stg}	storage temperature		–65	+175	°C
T_j	junction temperature				
	BY9304		–65	+160	°C
	BY9306		–65	+160	°C
	BY9308		–65	+155	°C
	BY9310		–65	+150	°C
	BY9312		–65	+145	°C
	BY9314		–65	+140	°C
	BY9316		–65	+140	°C
	BY9318		–65	+135	°C

Note

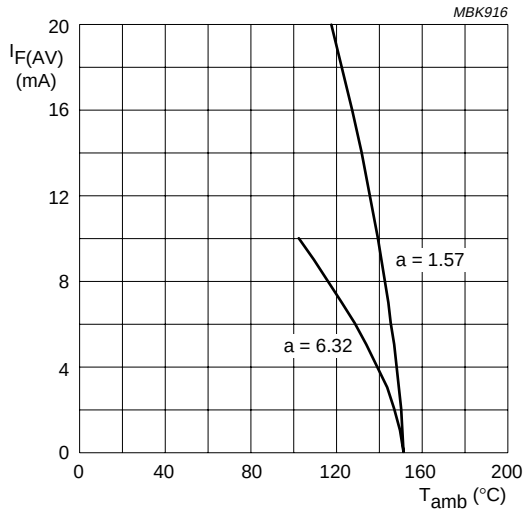
1. Withstands peak currents during flash-over in a picture tube.

ELECTRICAL CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 10 mA			
	BY9304		–	10	V
	BY9306		–	14	V
	BY9308		–	20	V
	BY9310		–	24	V
	BY9312		–	30	V
	BY9314		–	34	V
	BY9316		–	40	V
	BY9318		–	44	V
I_R	reverse current	$V_R = V_{RRM1}$	–	1	µA
		$V_R = V_{RRM1}$; T_j = 120 °C	–	3	µA
Q_r	recovery charge	when switched from I_F = 100 mA to $V_R \geq$ 100 V and dI_F/dt = –200 mA/µs	0.7	–	nC
t_{rr}	reverse recovery time	when switched from I_F = 2 mA to I_R = 4 mA; measured at I_R = 1 mA	–	80	ns
C_d	diode capacitance	V_R = 0; f = 1 MHz			
	BY9304		1.20	–	pF
	BY9306		0.80	–	pF
	BY9308		0.60	–	pF
	BY9310		0.50	–	pF
	BY9312		0.40	–	pF
	BY9314		0.35	–	pF
	BY9316		0.30	–	pF
	BY9318		0.25	–	pF

GRAPHICAL DATA



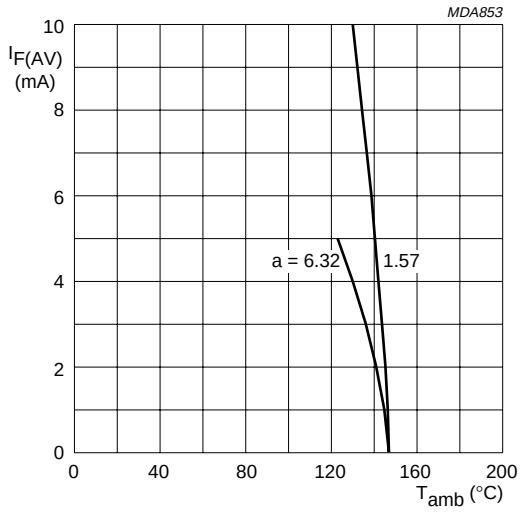
BY9304.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application.

Fig.2 Maximum permissible average forward current as a function of ambient temperature.



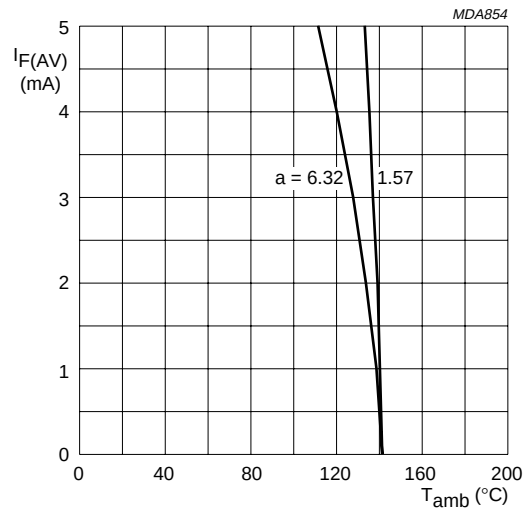
BY9306.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application.

Fig.3 Maximum permissible average forward current as a function of ambient temperature.



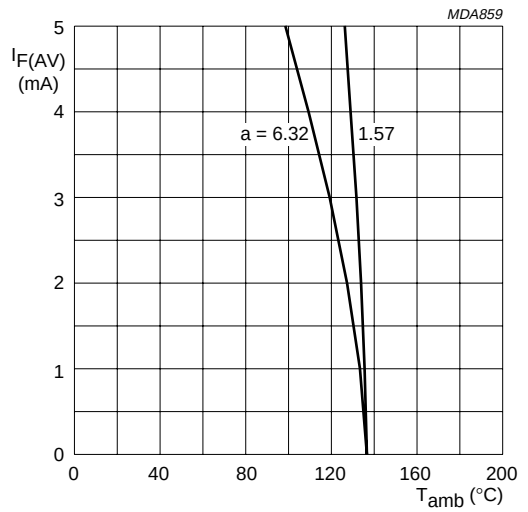
BY9308.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

a = 6.32: line output transformer application.

Fig.4 Maximum permissible average forward current as a function of ambient temperature.



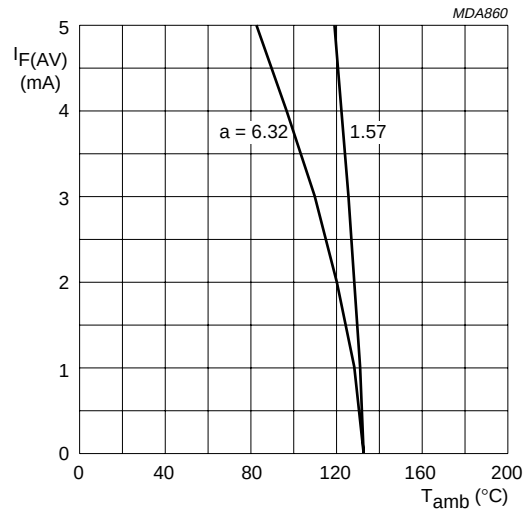
BY9310.

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.

a = 1.57: half sinewave.

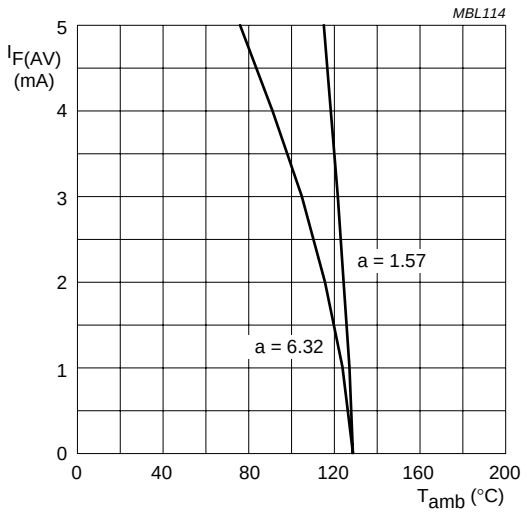
a = 6.32: line output transformer application.

Fig.5 Maximum permissible average forward current as a function of ambient temperature.



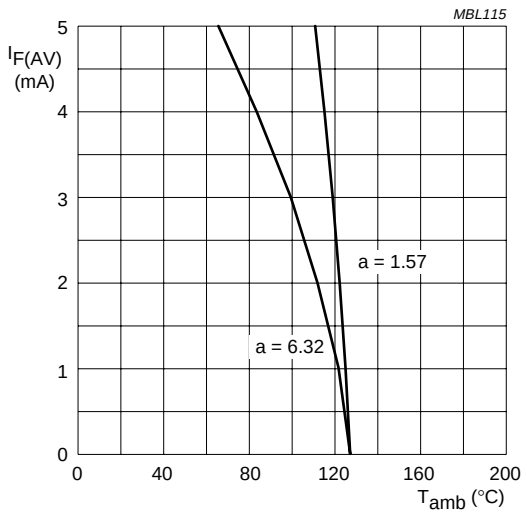
BY9312.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application.

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



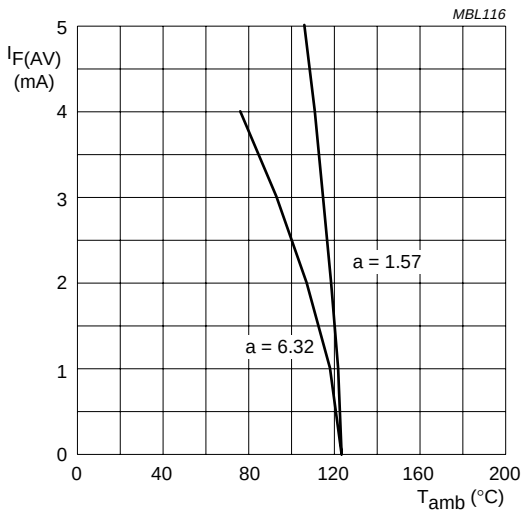
BY9314.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application.

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



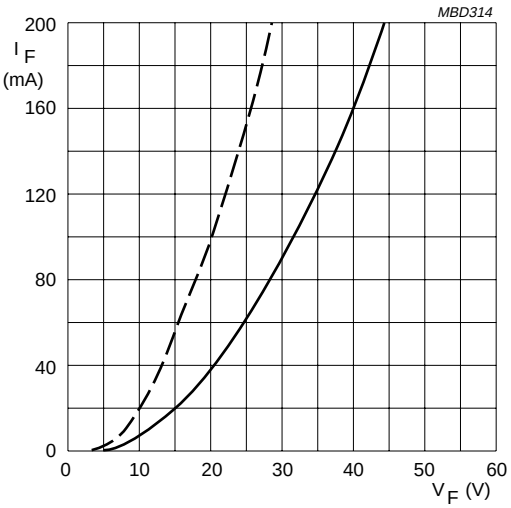
BY9316.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application.

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



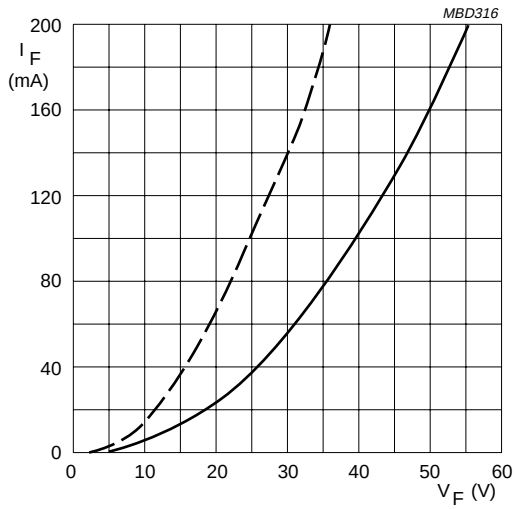
BY9318.
a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RWmax}$; $R_{th\ j\text{-}a} \leq 120$ K/W.
a = 1.57: half sinewave.
a = 6.32: line output transformer application.

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



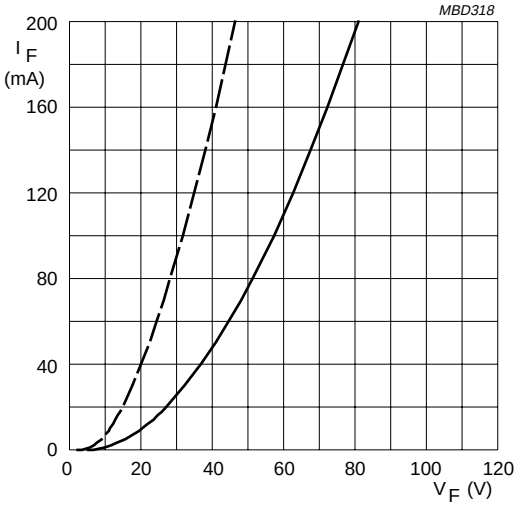
BY9304.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.10 Forward current as a function of maximum forward voltage.



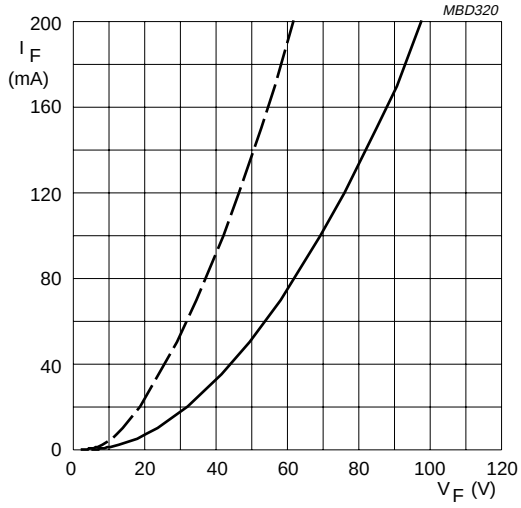
BY9306.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.11 Forward current as a function of maximum forward voltage.



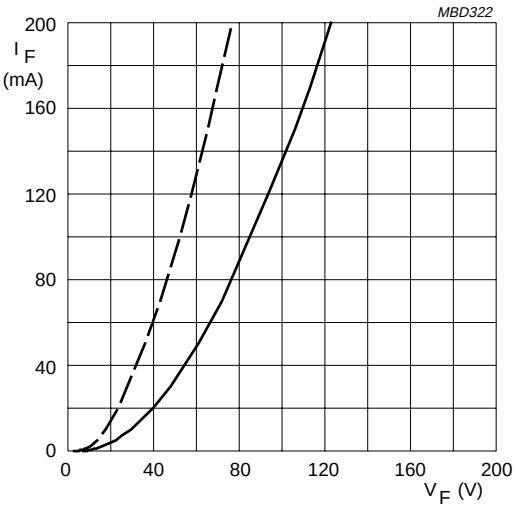
BY9308.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

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



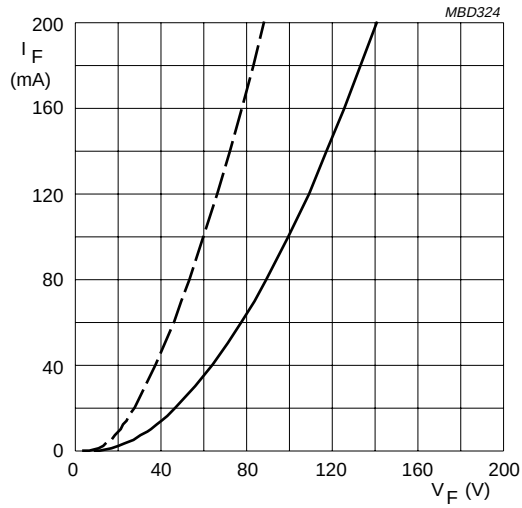
BY9310.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.13 Forward current as a function of maximum forward voltage.



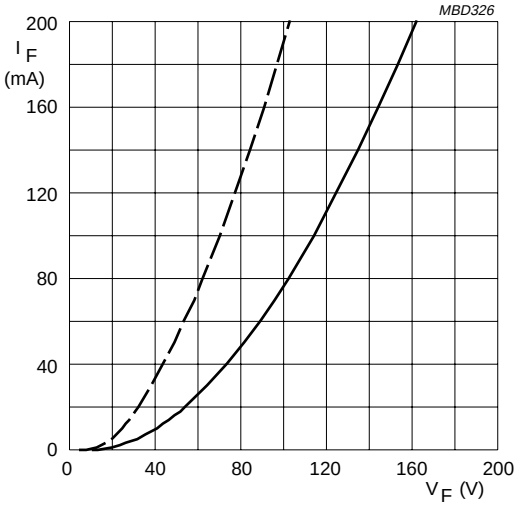
BY9312.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.14 Forward current as a function of maximum forward voltage.



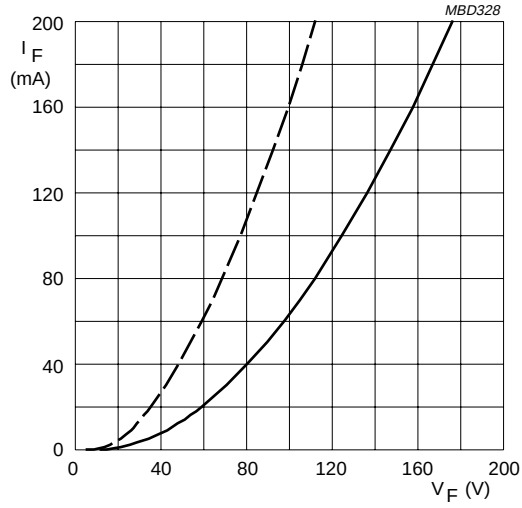
BY9314.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.15 Forward current as a function of maximum forward voltage.



BY9316.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.16 Forward current as a function of maximum forward voltage.

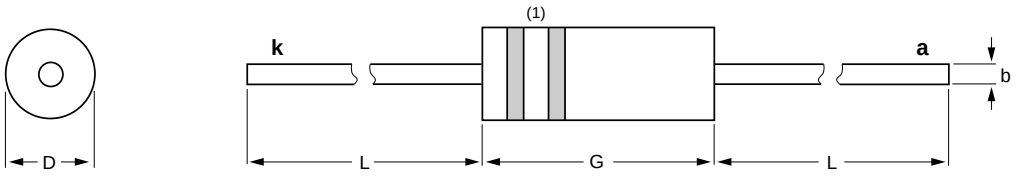


BY9318.
Dotted line: T_j = 120 °C.
Solid line: T_j = 25 °C.

Fig.17 Forward current as a function of maximum forward voltage.

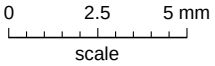
PACKAGE OUTLINES

Hermetically sealed plastic package; axial leaded; 2 leads **SOD118A**



DIMENSIONS (mm are the original dimensions)

UNIT	b	D	G	L min.
mm	0.5	2.6 2.4	6.7 6.3	31

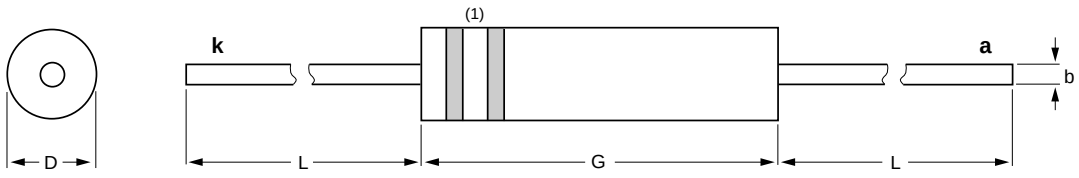


Note

1. The marking bands indicate the cathode.

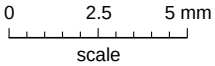
OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOD118A						98-05-28

Hermetically sealed plastic package; axial leaded; 2 leads **SOD118B**



DIMENSIONS (mm are the original dimensions)

UNIT	b	D	G	L min.
mm	0.5	2.6 2.4	10.5 9.5	29



Note

1. The marking bands indicate the cathode.

OUTLINE VERSION	REFERENCES				EUROPEAN PROJECTION	ISSUE DATE
	IEC	JEDEC	EIAJ			
SOD118B						98-05-28

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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