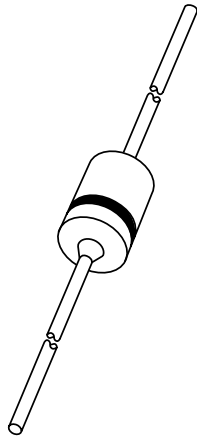


DATA SHEET



BAX12

Controlled avalanche diode

Product specification
Supersedes data of April 1996

1996 Sep 17

Controlled avalanche diode

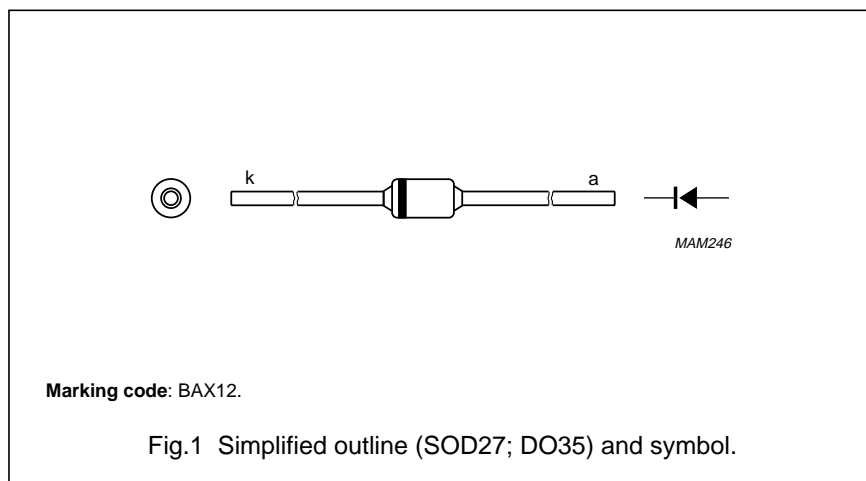
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FEATURES

- Hermetically sealed leaded glass SOD27 (DO-35) package
- Switching speed: max. 50 ns
- General application
- Continuous reverse voltage: max. 90 V
- Repetitive peak reverse voltage: max. 90 V
- Repetitive peak forward current: max. 800 mA
- Repetitive peak reverse current: max. 600 mA
- Capable of absorbing transients repetitively.

DESCRIPTION

The BAX12 is a controlled avalanche diode fabricated in planar technology, and encapsulated in the hermetically sealed leaded glass SOD27 (DO-35) package.



APPLICATIONS

- Switching of inductive loads in semi-electronic telephone exchanges.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RRM}	repetitive peak reverse voltage	note 1	—	90	V
V_R	continuous reverse voltage	note 1	—	90	V
I_F	continuous forward current	see Fig.2; note 2	—	400	mA
I_{FRM}	repetitive peak forward current		—	800	mA
I_{FSM}	non-repetitive peak forward current	square wave; $T_j = 25\text{ °C}$ prior to surge; see Fig.4 $t = 1\text{ }\mu\text{s}$ $t = 100\text{ }\mu\text{s}$ $t = 10\text{ ms}$	— — —	55 15 9	A A A
P_{tot}	total power dissipation	$T_{amb} = 25\text{ °C}$; note 2	—	450	mW
I_{RRM}	repetitive peak reverse current		—	600	mA
E_{RRM}	repetitive peak reverse energy	$t_p \geq 50\text{ }\mu\text{s}$; $f \leq 20\text{ Hz}$; $T_j = 25\text{ °C}$	—	5.0	mJ
T_{stg}	storage temperature		–65	+200	°C
T_j	junction temperature		—	200	°C

Notes

1. It is allowed to exceed this value; see Figs 8 and 9. Care should be taken not to exceed the I_{RRM} rating.
2. Device mounted on an FR4 printed circuit-board; lead length 10 mm.

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ELECTRICAL CHARACTERISTICS $T_j = 25\text{ }^{\circ}\text{C}$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	see Fig.3 $I_F = 10\text{ mA}$ $I_F = 50\text{ mA}$ $I_F = 100\text{ mA}$ $I_F = 200\text{ mA}$ $I_F = 400\text{ mA}$	— — — — —	750 840 900 1.0 1.25	mV mV mV V V
I_R	reverse current	see Fig.5 $V_R = 90\text{ V}$ $V_R = 90\text{ V}; T_j = 150\text{ }^{\circ}\text{C}$	— —	100 100	nA μA
$V_{(BR)R}$	reverse avalanche breakdown voltage	$I_R = 1\text{ mA}$	120	170	V
C_d	diode capacitance	$f = 1\text{ MHz}; V_R = 0$; see Fig.6	—	35	pF
t_{rr}	reverse recovery time	when switched from $I_F = 30\text{ mA}$ to $I_R = 30\text{ mA}$; $R_L = 100\text{ }\Omega$; measured at $I_R = 3\text{ mA}$; see Fig.10	—	50	ns

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j-tp}$	thermal resistance from junction to tie-point	lead length 10 mm	240	K/W
$R_{th\ j-a}$	thermal resistance from junction to ambient	lead length 10 mm; note 1	375	K/W

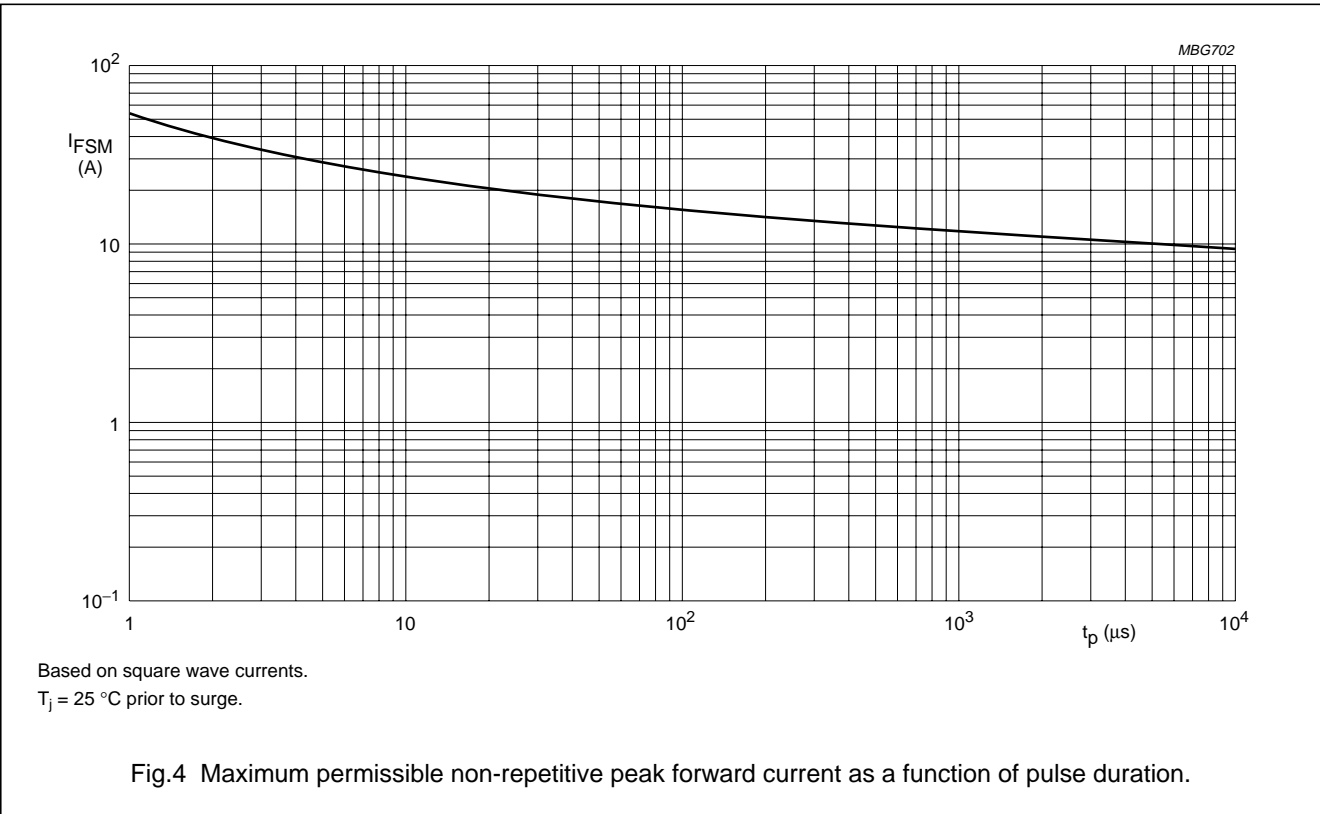
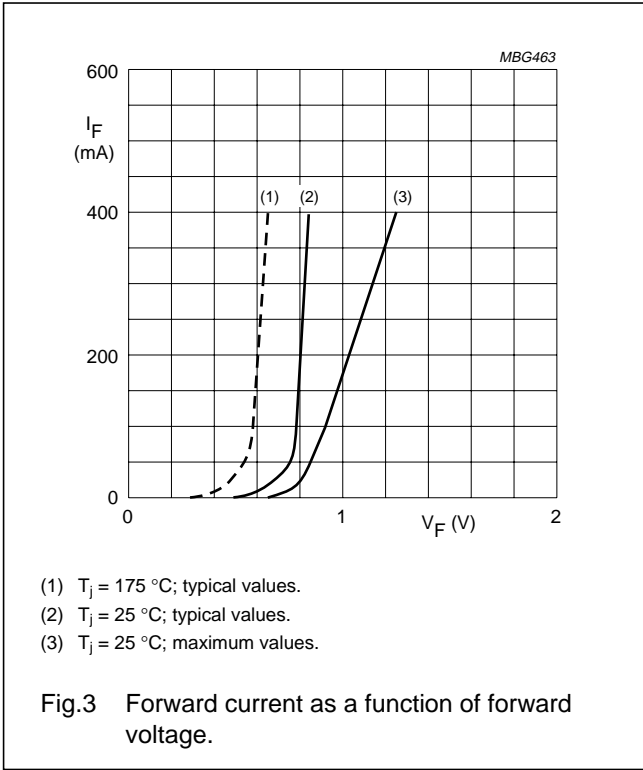
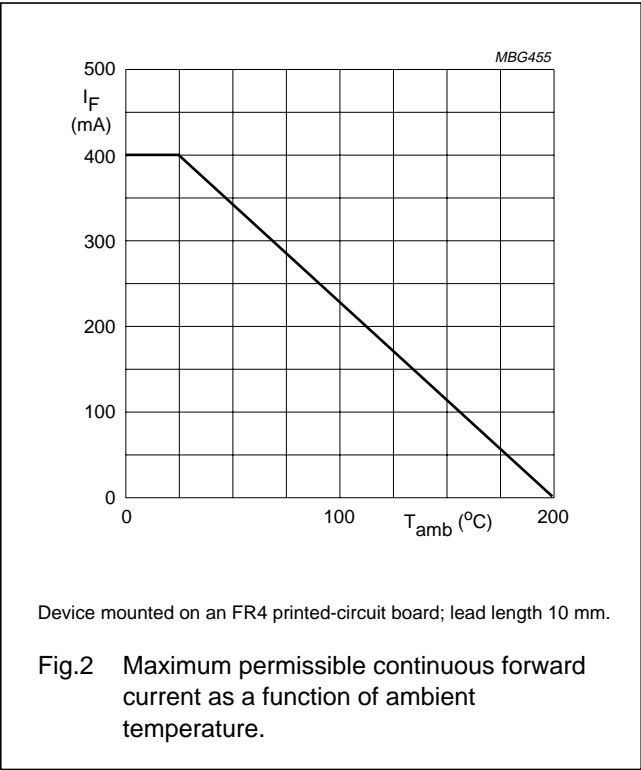
Note

1. Device mounted on a printed circuit-board without metallization pad.

Controlled avalanche diode

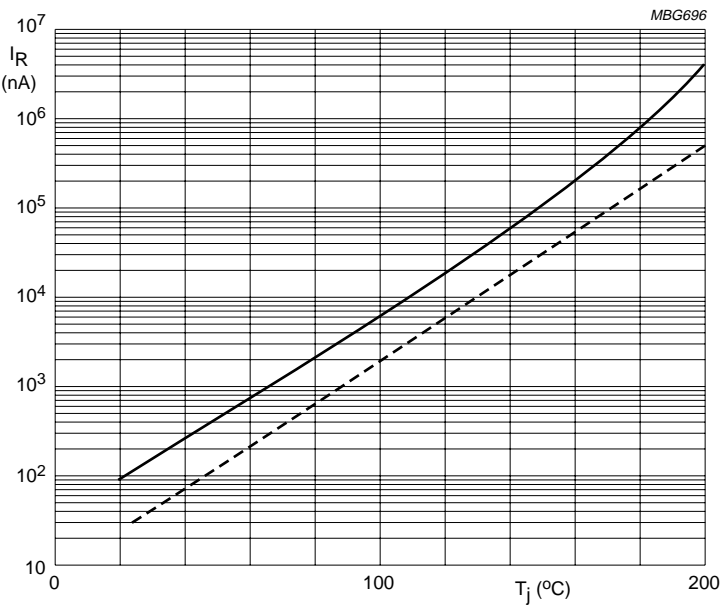
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GRAPHICAL DATA



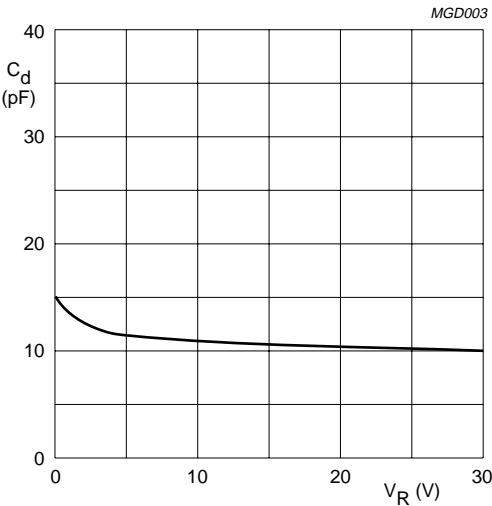
Controlled avalanche diode

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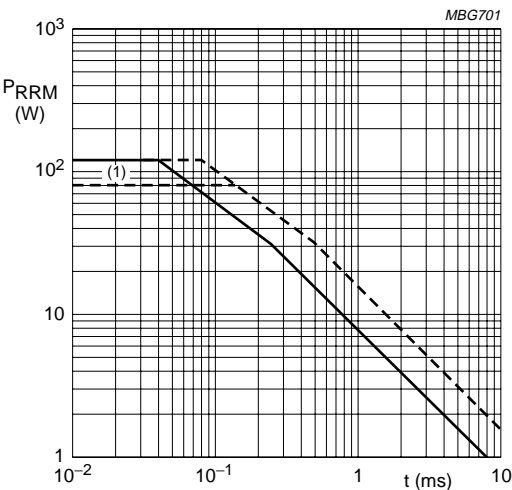
$V_R = 90\text{ V}$.
Solid line; maximum values. Dotted line; typical values.

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



$f = 1\text{ MHz}$; $T_j = 25\text{ °C}$.

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

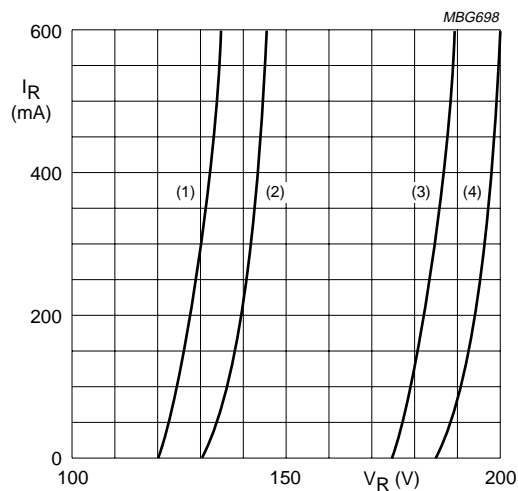


Solid line; rectangular waveform; $\delta \leq 0.01$.
Dotted line; triangular waveform; $\delta \leq 0.02$.
(1) Limited by $I_{RMM} = 600\text{ mA}$.

Fig.7 Maximum permissible repetitive peak reverse power as a function of the pulse duration $T \geq 50\text{ ms}$; $T_j = 25\text{ °C}$.

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Reverse voltages higher than the V_R ratings are allowed, provided:

a. The transient energy ≤ 7.5 mJ at $P_{RRM} \leq 30$ W; $T_j = 25$ °C;
the transient energy ≤ 5 mJ at $P_{RRM} = 120$ W; $T_j = 25$ °C (see Fig.7).

b. $T \geq 50$ ms; $\delta \leq 0.01$ (rectangular waveform) (see Fig.9).
 $\delta \leq 0.02$ (triangular waveform) (see Fig.9).

With increasing temperature, the maximum permissible transient energy must be decreased by 0.03 mJ/K.

(1) $T_j = 25$ °C; minimum values.
(2) $T_j = 175$ °C; minimum values.
(3) $T_j = 25$ °C; maximum values.
(4) $T_j = 175$ °C; maximum values.

Fig.8 Reverse current as a function of continuous reverse voltage.

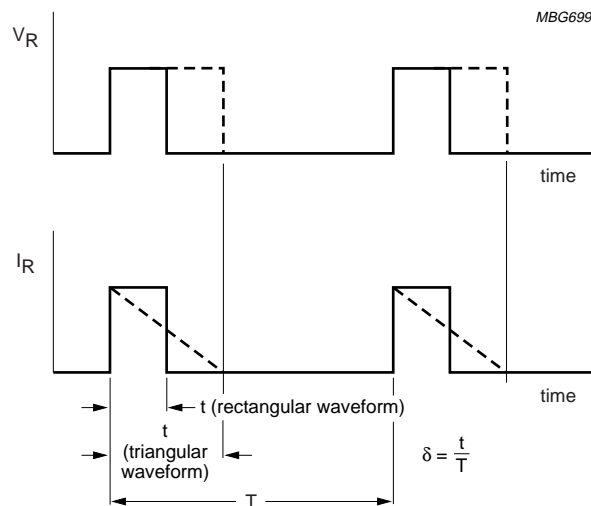
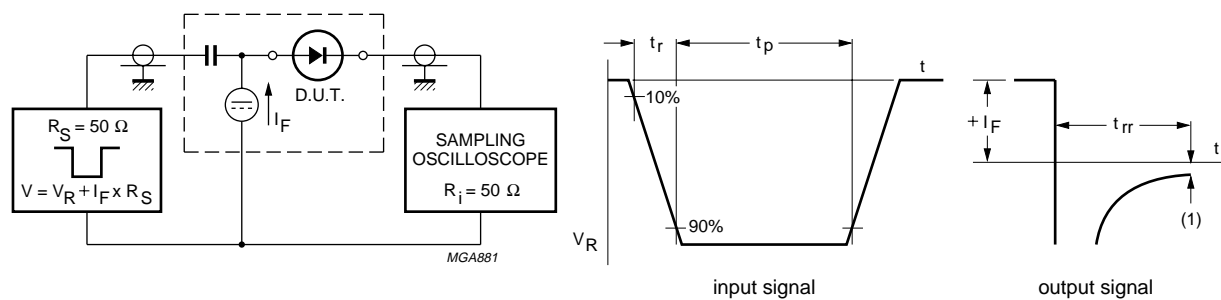


Fig.9 Peak reverse voltage and current test pulses.

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Input signal: reverse pulse rise time $t_r = 0.6\text{ ns}$; reverse pulse duration $t_p = 100\text{ ns}$; duty factor $\delta = 0.05$.

Oscilloscope: rise time $t_r = 0.35\text{ ns}$.

Circuit capacitance: $C \leq 1\text{ pF}$ (oscilloscope input capacitance + parasitic capacitance).

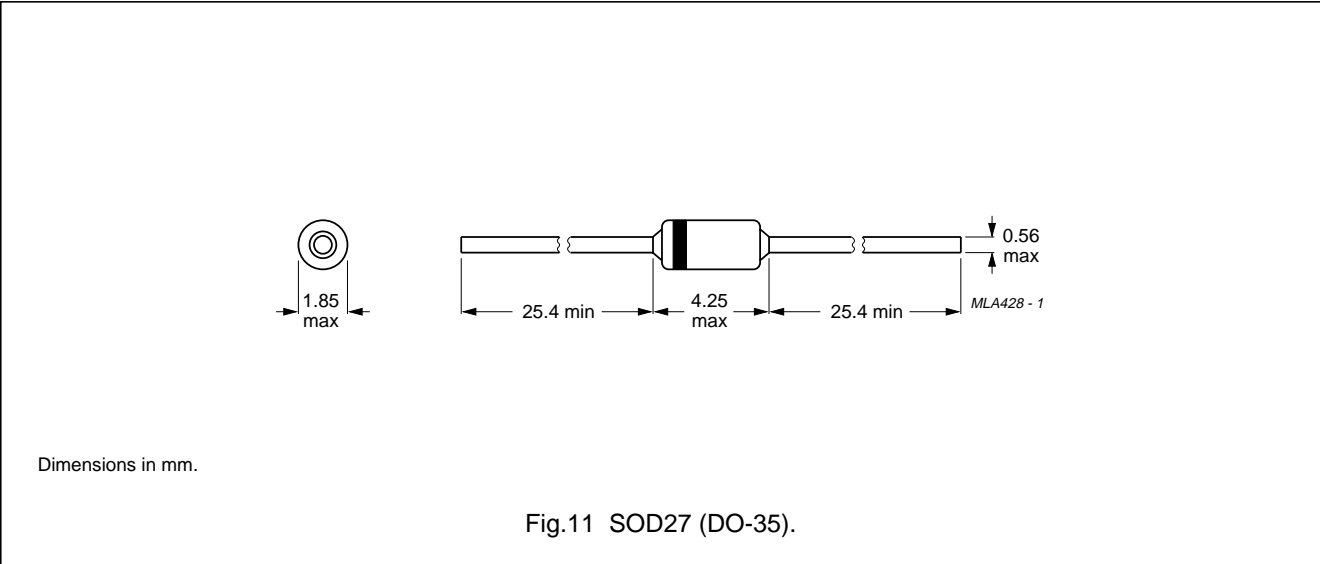
(1) $I_R = 3\text{ mA}$.

Fig.10 Reverse recovery voltage test circuit and waveforms.

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PACKAGE OUTLINE



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.