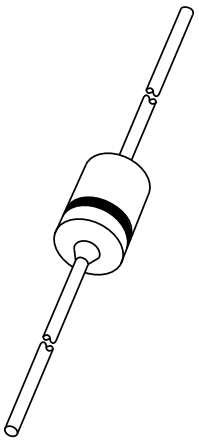
DATA SHEET



BAX12
Controlled avalanche diode

Product specification
Supersedes data of April 1996
File under Discrete Semiconductors, SC01

1996 Sep 17

Philips
Semiconductors

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Controlled avalanche diode BAX12

FEATURES

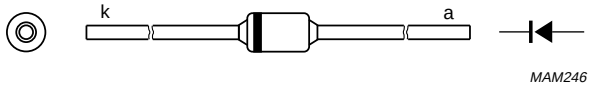
- Hermetically sealed leaded glass SOD27 (DO-35) package
- Switching speed: max. 50 ns
- General application
- Continuous reverse voltage: max. 90 V
- Repetitive peak reverse voltage: max. 90 V
- Repetitive peak forward current: max. 800 mA
- Repetitive peak reverse current: max. 600 mA
- Capable of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

APPLICATIONS

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

DESCRIPTION

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



Marking code: BAX12.

Fig.1 Simplified outline (SOD27; DO35) and symbol.

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 °C prior to surge; see Fig.4			
		t = 1 μs	–	55	A
		t = 100 μs	–	15	A
		t = 10 ms	–	9	A
P_{tot}	total power dissipation	T_{amb} = 25 °C; note 2	–	450	mW
I_{RRM}	repetitive peak reverse current		–	600	mA
E_{RRM}	repetitive peak reverse energy	$t_p \geq 50$ μs; $f \leq 20$ Hz; T_j = 25 °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.

ELECTRICAL CHARACTERISTICS

T_j = 25 °C; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_F	forward voltage	see Fig.3			
		I_F = 10 mA	–	750	mV
		I_F = 50 mA	–	840	mV
		I_F = 100 mA	–	900	mV
		I_F = 200 mA	–	1.0	V
		I_F = 400 mA	–	1.25	V
I_R	reverse current	see Fig.5			
		V_R = 90 V	–	100	nA
		V_R = 90 V; T_j = 150 °C	–	100	µA
$V_{(BR)R}$	reverse avalanche breakdown voltage	I_R = 1 mA	120	170	V
C_d	diode capacitance	f = 1 MHz; V_R = 0; see Fig.6	–	35	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; see Fig.10	–	50	ns

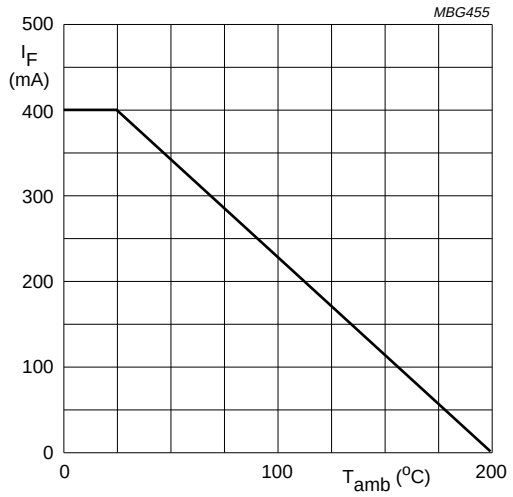
THERMAL CHARACTERISTICS

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

Note

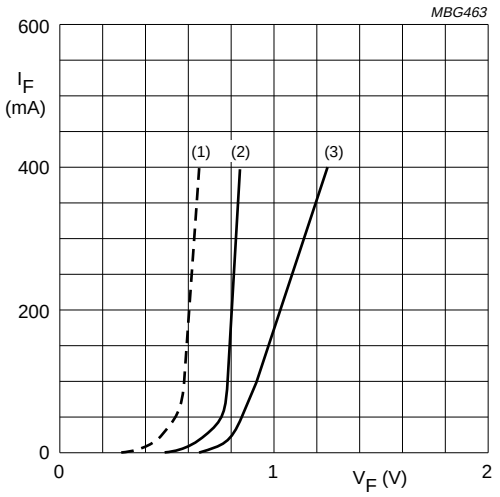
1. Device mounted on a printed circuit-board without metallization pad.

GRAPHICAL DATA



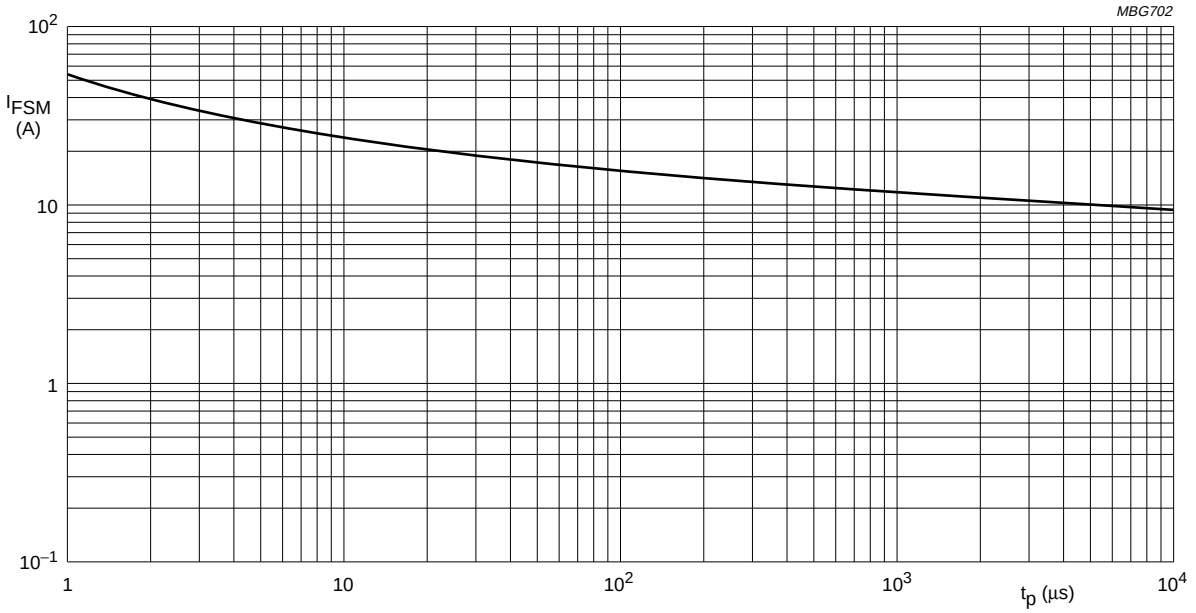
Device mounted on an FR4 printed-circuit board; lead length 10 mm.

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



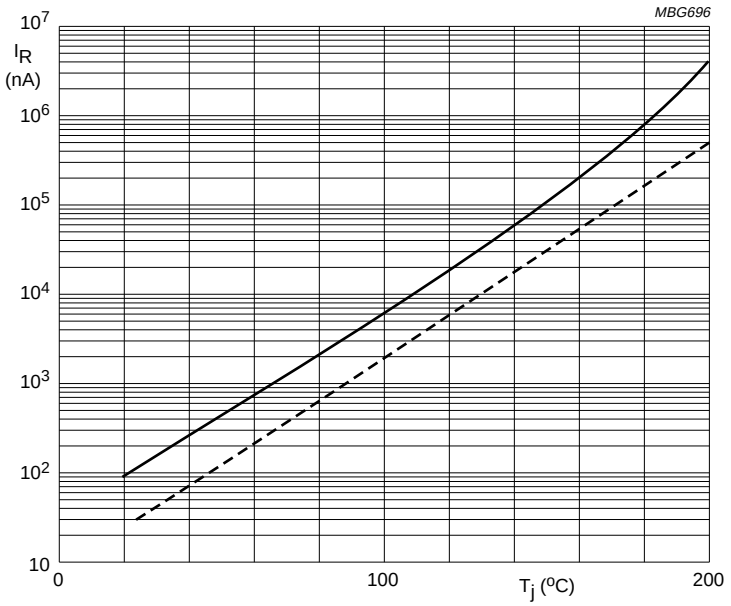
(1) T_j = 175 °C; typical values.
(2) T_j = 25 °C; typical values.
(3) T_j = 25 °C; maximum values.

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



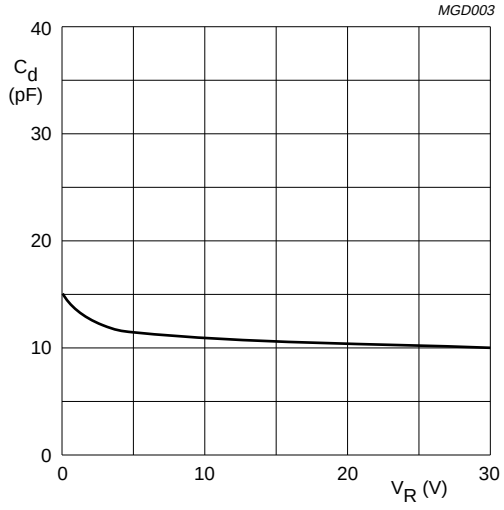
Based on square wave currents.
T_j = 25 °C prior to surge.

Fig.4 Maximum permissible non-repetitive peak forward current as a function of pulse duration.



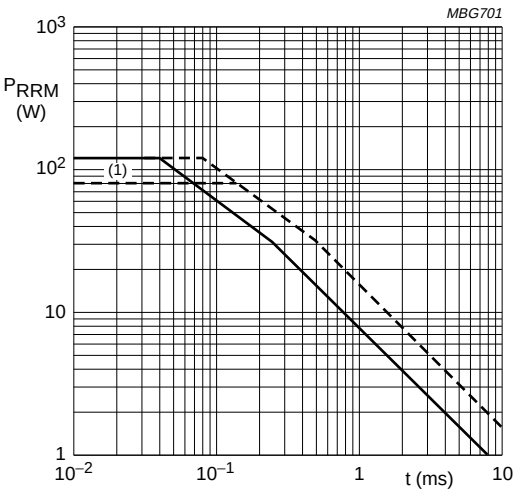
V_R = 90 V.
Solid line; maximum values. Dotted line; typical values.

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



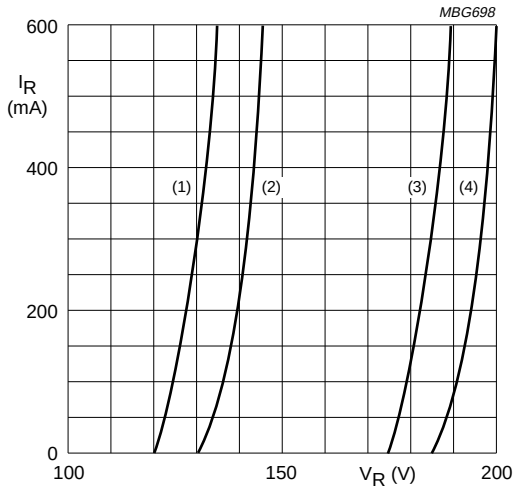
f = 1 MHz; T_j = 25 °C.

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



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

Fig.7 Maximum permissible repetitive peak reverse power as a function of the pulse duration T ≥ 50 ms; T_j = 25 °C.



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.7).

b. T ≥ 50 ms; δ ≤0.01 (rectangular waveform) (see Fig.9).
δ ≤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.

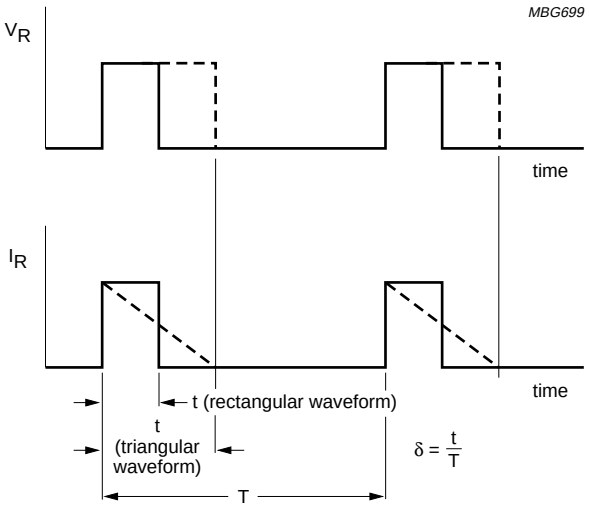
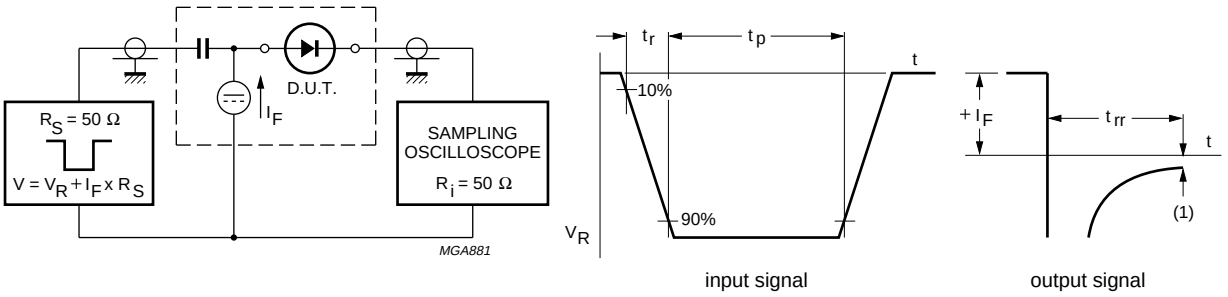


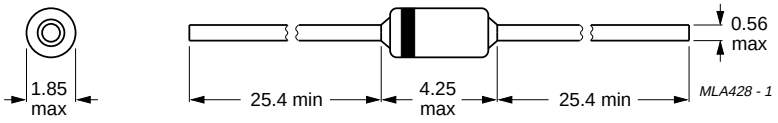
Fig.9 Peak reverse voltage and current test pulses.



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 (oscilloscope input capacitance + parasitic capacitance).
(1) I_R = 3 mA.

Fig.10 Reverse recovery voltage test circuit and waveforms.

PACKAGE OUTLINE



Dimensions in mm.

Fig.11 SOD27 (DO-35).

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

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