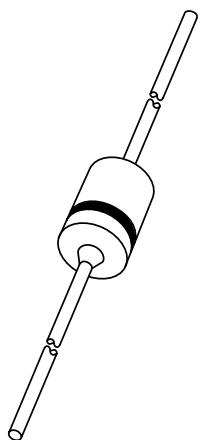


# DATA SHEET



## **BAX12** Controlled avalanche diode

Product specification  
Supersedes data of April 1996

1996 Sep 17

## 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.

## 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; $T_j = 25^\circ\text{C}$ prior to surge; see Fig.4 $t = 1 \mu\text{s}$ $t = 100 \mu\text{s}$ $t = 10 \text{ ms}$	– – –	55 15 9	A
$P_{\text{tot}}$	total power dissipation	$T_{\text{amb}} = 25^\circ\text{C}$ ; note 2	–	450	mW
$I_{RRM}$	repetitive peak reverse current		–	600	mA
$E_{RRM}$	repetitive peak reverse energy	$t_p \geq 50 \mu\text{s}$ ; $f \leq 20 \text{ Hz}$ ; $T_j = 25^\circ\text{C}$	–	5.0	mJ
$T_{\text{stg}}$	storage temperature		–65	+200	$^\circ\text{C}$
$T_j$	junction temperature		–	200	$^\circ\text{C}$

## 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.

## Controlled avalanche diode

BAX12

## ELECTRICAL CHARACTERISTICS

 $T_j = 25^\circ\text{C}$ ; 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 $V_R = 90 \text{ V}$ $V_R = 90 \text{ V}; T_j = 150^\circ\text{C}$	— —	100 100	nA $\mu\text{A}$
$V_{(BR)R}$	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 $I_R = 30 \text{ mA}$ ; $R_L = 100 \Omega$ ; 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

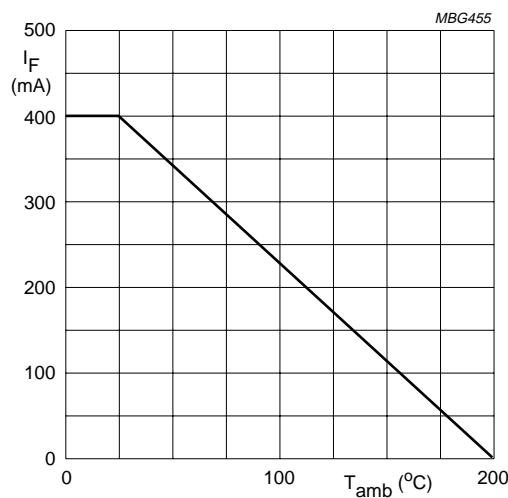
## Note

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

## Controlled avalanche diode

BAX12

## 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.

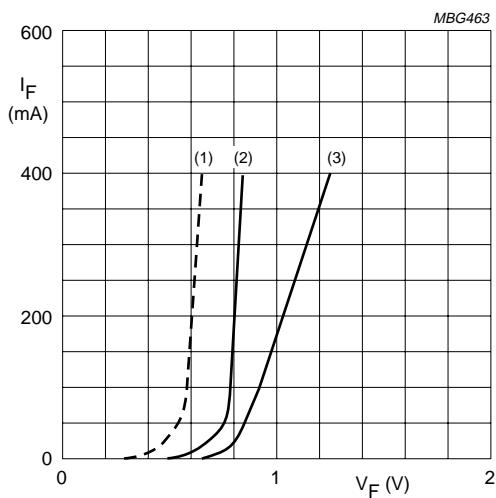
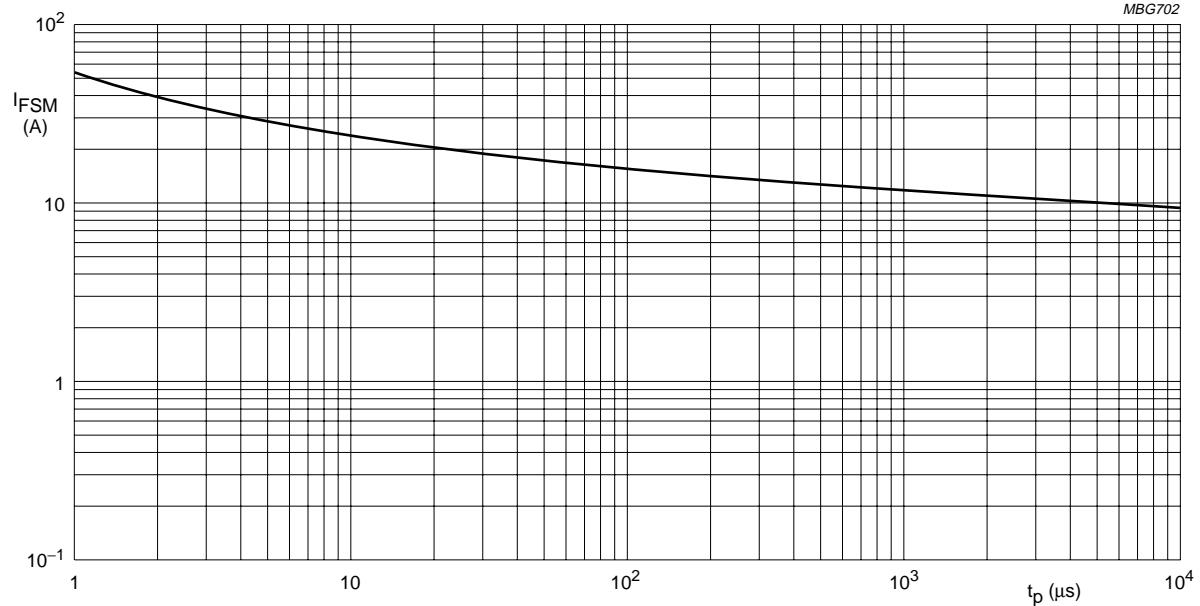


Fig.3 Forward current as a function of forward voltage.



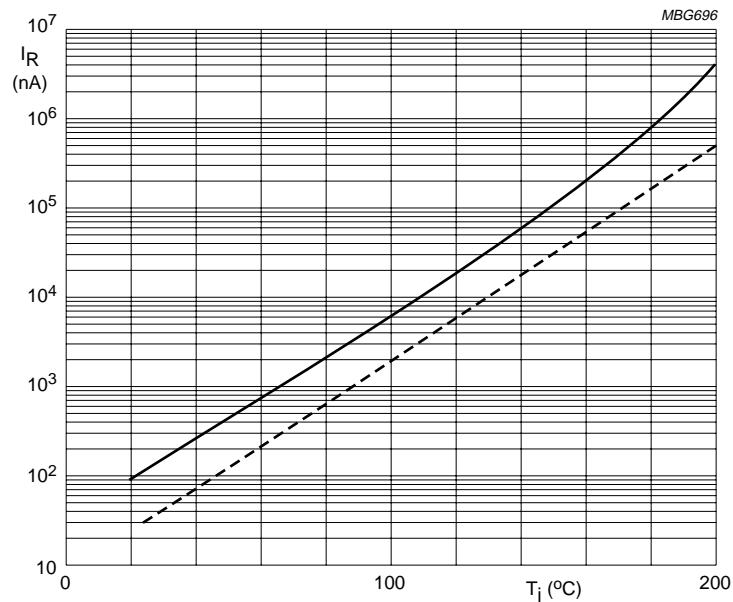
Based on square wave currents.

$T_j = 25$  °C prior to surge.

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

## Controlled avalanche diode

BAX12

 $V_R = 90$  V.

Solid line; maximum values. Dotted line; typical values.

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

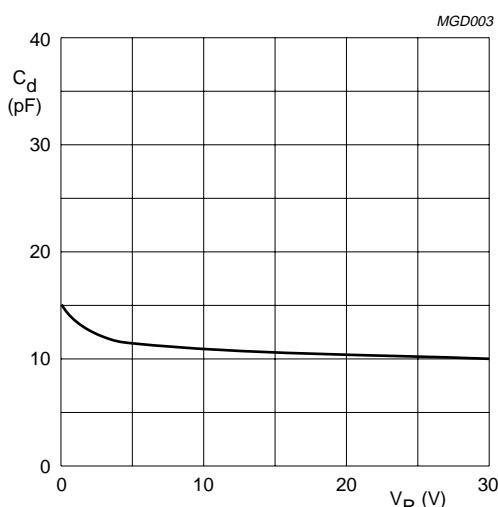
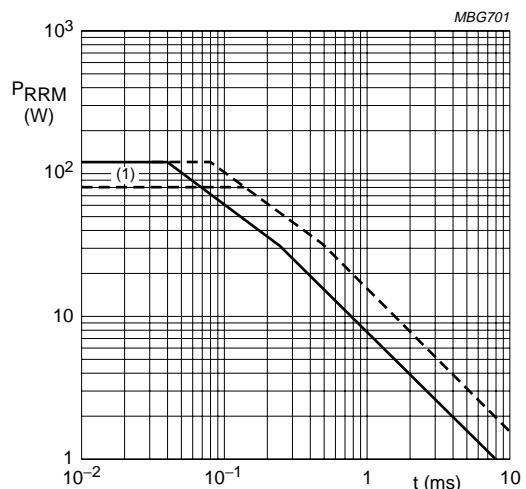
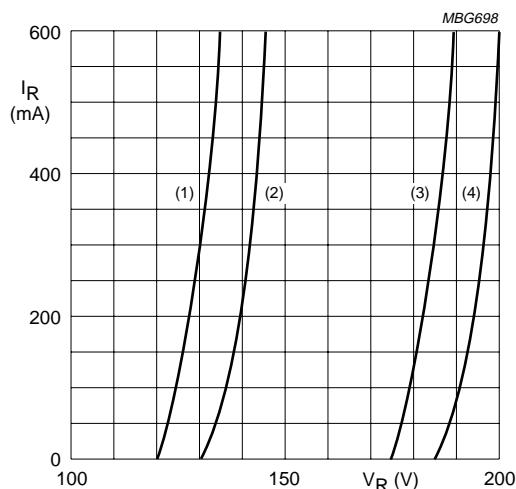
 $f = 1$  MHz;  $T_j = 25$  °C.

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  $T \geq 50$  ms;  $T_j = 25$  °C.

## Controlled avalanche diode

BAX12



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

- a. The transient energy  $\leq 7.5$  mJ at  $P_{RRM} \leq 30$  W;  $T_j = 25$  °C;  
the transient energy  $\leq 5$  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.

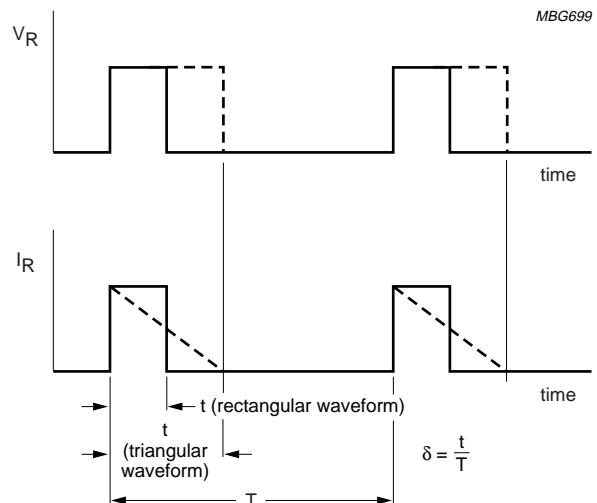
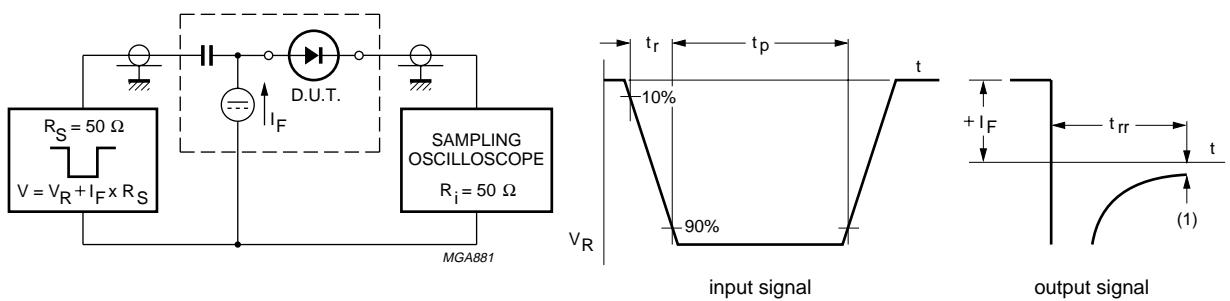


Fig.9 Peak reverse voltage and current test pulses.

## Controlled avalanche diode

BAX12



**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).

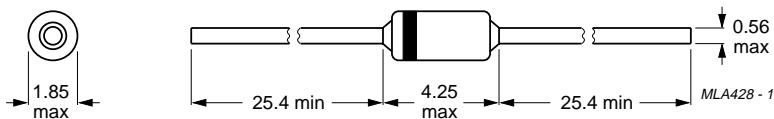
(1)  $I_R = 3 \text{ mA}$ .

Fig.10 Reverse recovery voltage test circuit and waveforms.

## Controlled avalanche diode

BAX12

## PACKAGE OUTLINE



Dimensions in mm.

Fig.11 SOD27 (DO-35).

## DEFINITIONS

<b>Data Sheet Status</b>	
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.
<b>Limiting values</b>	
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.	
<b>Application information</b>	
Where application information is given, it is advisory and does not form part of the specification.	

## LIFE SUPPORT APPLICATIONS

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