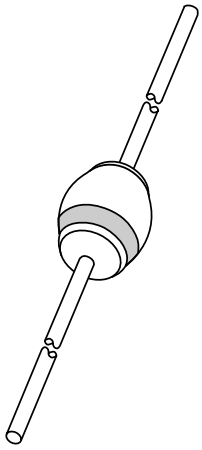
# DATA SHEET



# 1N5059 to 1N5062
## Controlled avalanche rectifiers

Product specification
Supersedes data of April 1992

1996 Jun 19

www.datasheet.support

Philips
Semiconductors

PHILIPS

# Controlled avalanche rectifiers 1N5059 to 1N5062

## FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Guaranteed avalanche energy absorption capability
- Available in ammo-pack.

## DESCRIPTION

Rugged glass package, using a high temperature alloyed construction. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

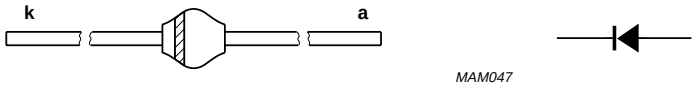



Fig.1 Simplified outline (SOD57) and symbol.

## LIMITING VALUES

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

| SYMBOL | PARAMETER | CONDITIONS | MIN. | MAX. | UNIT |
|---|---|---|---|---|---|
| $V_{RRM}$ | repetitive peak reverse voltage | | | | |
| | 1N5059 | | – | 200 | V |
| | 1N5060 | | – | 400 | V |
| | 1N5061 | | – | 600 | V |
| | 1N5062 | | – | 800 | V |
| $V_{RWM}$ | crest working reverse voltage | | | | |
| | 1N5059 | | – | 200 | V |
| | 1N5060 | | – | 400 | V |
| | 1N5061 | | – | 600 | V |
| | 1N5062 | | – | 800 | V |
| $V_R$ | continuous reverse voltage | | | | |
| | 1N5059 | | – | 200 | V |
| | 1N5060 | | – | 400 | V |
| | 1N5061 | | – | 600 | V |
| | 1N5062 | | – | 800 | V |
| $I_{F(AV)}$ | average forward current | $T_{tp}$ = 45 °C; lead length = 10 mm; averaged over any 20 ms period; see Figs 2 and 4 | – | 2.0 | A |
| | | $T_{amb}$ = 80 °C; PCB mounting (see Fig.9); averaged over any 20 ms period; see Figs 3 and 4 | – | 0.8 | A |
| $I_{FSM}$ | non-repetitive peak forward current | t = 10 ms half sinewave | – | 50 | A |
| $E_{RSM}$ | non-repetitive peak reverse avalanche energy | L = 120 mH; $T_j = T_{j\,max}$ prior to surge; inductive load switched off | – | 20 | mJ |
| $T_{stg}$ | storage temperature | | –65 | +175 | °C |
| $T_j$ | junction temperature | see Fig.5 | –65 | +175 | °C |

## ELECTRICAL CHARACTERISTICS

$T_j$ = 25 °C; unless otherwise specified.

| SYMBOL | PARAMETER | CONDITIONS | MIN. | TYP. | MAX. | UNIT |
|---|---|---|---|---|---|---|
| $V_F$ | forward voltage | $I_F$ = 1 A; $T_j = T_{j\,max}$; see Fig.6 | – | – | 0.8 | V |
| | | $I_F$ = 1 A; see Fig.6 | – | – | 1.0 | V |
| $V_{(BR)R}$ | reverse avalanche breakdown voltage | $I_R$ = 0.1 mA | | | | |
| | 1N5059 | | 225 | – | – | V |
| | 1N5060 | | 450 | – | – | V |
| | 1N5061 | | 650 | – | – | V |
| | 1N5062 | | 900 | – | – | V |
| $I_R$ | reverse current | $V_R = V_{RRMmax}$; see Fig.7 | – | – | 1 | µA |
| | | $V_R = V_{RRMmax}$; $T_j$ = 165 °C; see Fig.7 | – | – | 150 | µA |
| $t_{rr}$ | reverse recovery time | when switched from $I_F$ = 0.5 A to $I_R$ = 1 A; measured at $I_R$ = 0.25 A; see Fig.10 | – | 3 | – | µs |
| $C_d$ | diode capacitance | $V_R$ = 0 V; f = 1 MHz; see Fig.8 | – | 50 | – | pF |

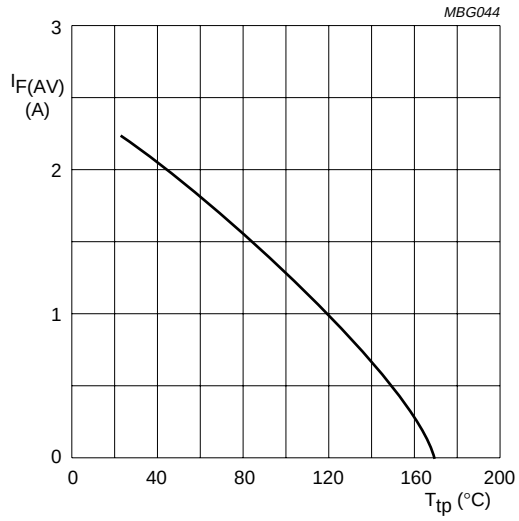
## THERMAL CHARACTERISTICS

| SYMBOL | PARAMETER | CONDITIONS | VALUE | UNIT |
|---|---|---|---|---|
| $R_{th\ j\text{-}tp}$ | thermal resistance from junction to tie-point | lead length = 10 mm | 46 | K/W |
| $R_{th\ j\text{-}a}$ | thermal resistance from junction to ambient | note 1 | 100 | K/W |

**Note**

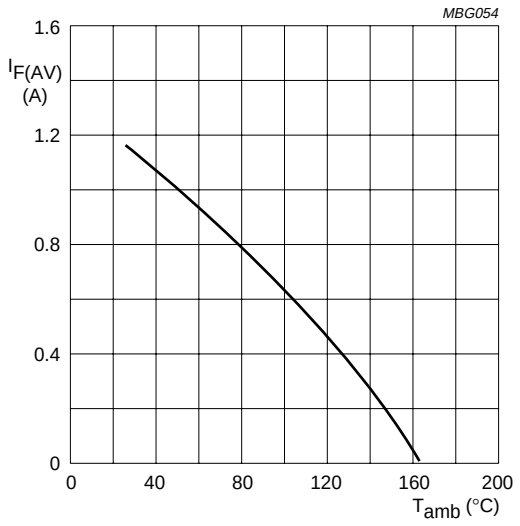
1. Device mounted on epoxy-glass printed-circuit board, 1.5 mm thick; thickness of copper ≥40 µm, see Fig.9. For more information please refer to the *"General Part of associated Handbook"*.

## GRAPHICAL DATA



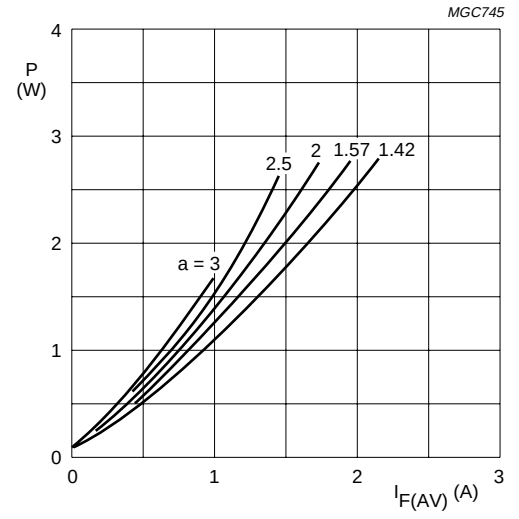

a = 1.57; $V_R = V_{RRMmax}$; δ = 0.5.
Lead length 10 mm.

Fig.2 Maximum permissible average forward current as a function of tie-point temperature (including losses due to reverse leakage).



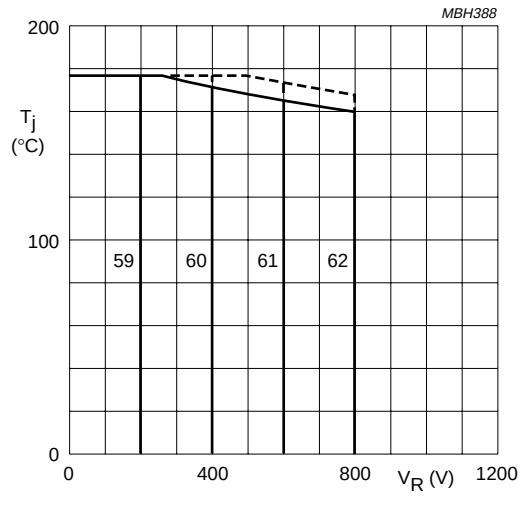

a = 1.57; $V_R = V_{RRMmax}$; δ = 0.5.
Device mounted as shown in Fig.9.

Fig.3 Maximum permissible average forward current as a function of ambient temperature (including losses due to reverse leakage).



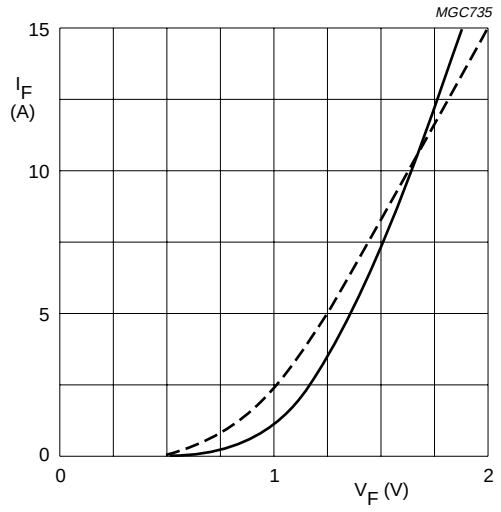

a = $I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$; δ = 0.5.

Fig.4 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.



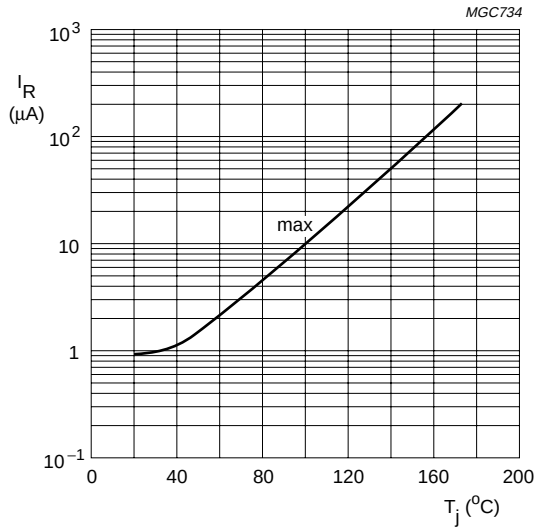

Solid line = $V_R$.
Dotted line = $V_{RRM}$; δ = 0.5.

Fig.5 Maximum permissible junction temperature as a function of reverse voltage.



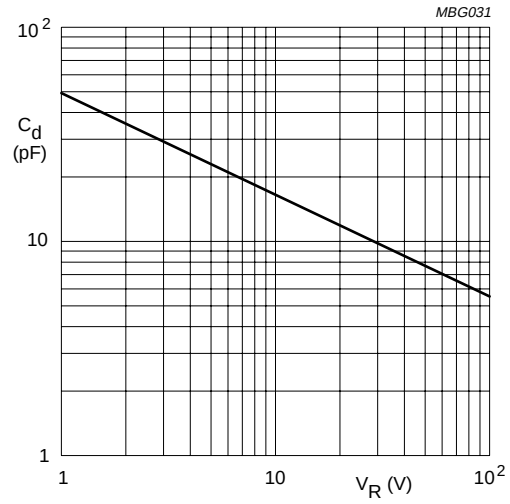

Solid line: $T_j$ = 25 °C.
Dotted line: $T_j$ = 175 °C.

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



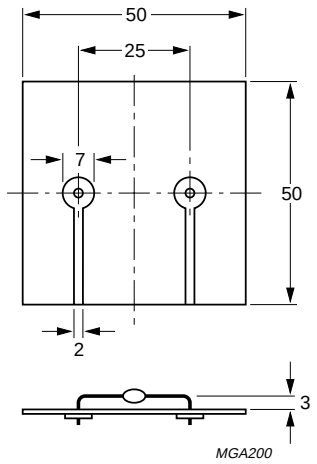

$V_R = V_{RRMmax}$.

Fig.7 Reverse current as a function of junction temperature; maximum values.



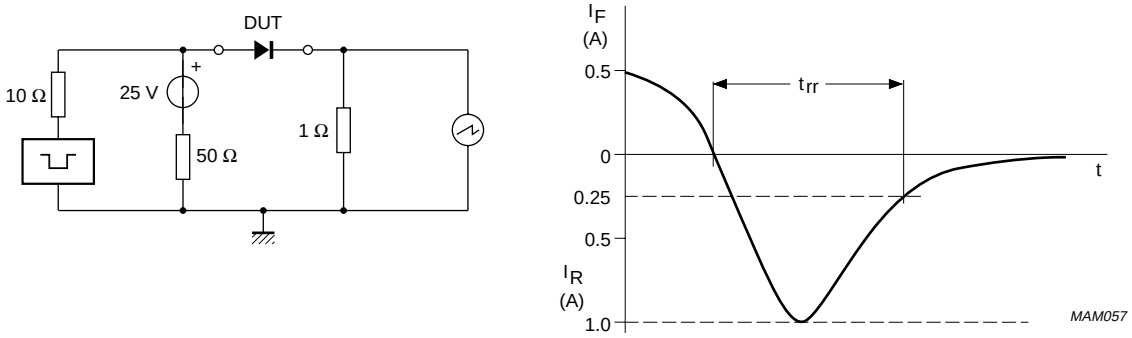

f = 1 MHz; $T_j$ = 25 °C.

Fig.8 Diode capacitance as a function of reverse voltage; typical values.




Dimensions in mm.

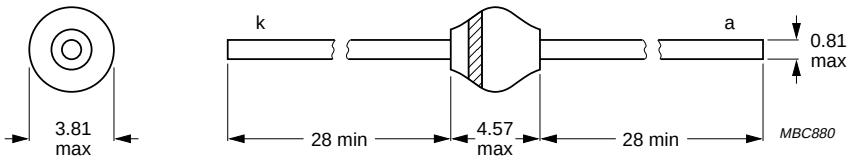
Fig.9 Device mounted on a printed-circuit board.




Input impedance oscilloscope: 1 MΩ, 22 pF; $t_r \leq 7$ ns.
Source impedance: 50 Ω; $t_r \leq 15$ ns.

Fig.10 Test circuit and reverse recovery time waveform and definition.

## PACKAGE OUTLINE




Dimensions in mm.

Fig.11 SOD57.

## 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. | |

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