Silicon Diode

BYD47-20

2000V/800mA

DATASHEET

OEM – Philips

Source: Philips Databook 1999

Datasheet Rev. 1.3 – 04/19 –data without warranty / liability

Fast soft-recovery rectifiers BYD47 series

FEATURES

- Glass passivated
- High maximum operating temperature
- Low leakage current
- Excellent stability
- Shipped in 8 mm embossed tape
- Smallest surface mount rectifier outline.

DESCRIPTION

Cavity free cylindrical glass SOD87 package through Implotec™(1) technology. This package is hermetically sealed and fatigue free as coefficients of expansion of all used parts are matched.

(1) Implotec is a trademark of Philips.

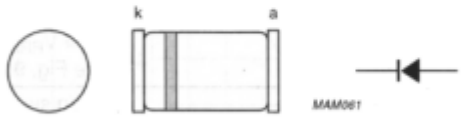

Fig.1 Simplified outline (SOD87) and symbol.

LIMITING VALUES

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

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{RSM}	non-repetitive peak reverse voltage				
	BYD47-16		–	1700	V
	BYD47-18		–	1900	V
	BYD47-20		–	2100	V
V_{RRM}	repetitive peak reverse voltage				
	BYD47-16		–	1600	V
	BYD47-18		–	1800	V
	BYD47-20		–	2000	V
$I_{F(AV)}$	average forward current	T_{tp} = 105 °C; see Fig. 2; averaged over any 20 ms period; see also Fig. 6	–	0.80	A
$I_{F(AV)}$	average forward current	T_{amb} = 25 °C; PCB mounting (see Fig.11); see Fig. 3; averaged over any 20 ms period; see also Fig. 6	–	0.34	A
I_{FRM}	repetitive peak forward current	T_{tp} = 85 °C; see Fig. 4	–	8.0	A
		T_{amb} = 65 °C; see Fig. 5	–	2.8	A
I_{FSM}	non-repetitive peak forward current	t = 10 ms half sine wave; $T_j = T_{j\,max}$ prior to surge; $V_R = V_{RRMmax}$	–	10	A
T_{stg}	storage temperature		–65	+175	°C
T_j	junction temperature	see Fig. 7	–65	+175	°C

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ELECTRICAL CHARACTERISTICS

T_j = 25 °C unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	TYP.	MAX.	UNIT
V_F	forward voltage	I_F = 1 A; $T_j = T_{j\,max}$; see Fig. 8	–	2.05	V
		I_F = 1 A; see Fig. 8	–	2.40	V
I_R	reverse current	$V_R = V_{RRMmax}$; see Fig. 9	–	5	µA
		$V_R = V_{RRMmax}$; T_j = 125 °C; see Fig. 9	–	50	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. 12	–	300	ns
C_d	diode capacitance	f = 1 MHz; V_R = 0 V; see Fig. 10	15	–	pF
$\left\|\frac{dI_R}{dt}\right\|$	maximum slope of reverse recovery current	when switched from I_F = 1 A to $V_R \geq 30$ V and $dI_F/dt = -1$ A/µs; see Fig.13	–	5	A/µs

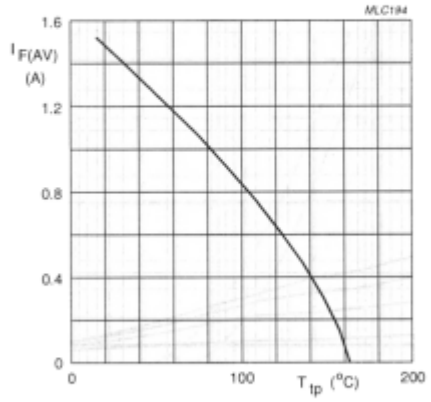
THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	CONDITIONS	VALUE	UNIT
$R_{th\ j\text{-}tp}$	thermal resistance from junction to tie-point		30	K/W
$R_{th\ j\text{-}a}$	thermal resistance from junction to ambient	note 1	150	K/W

Note

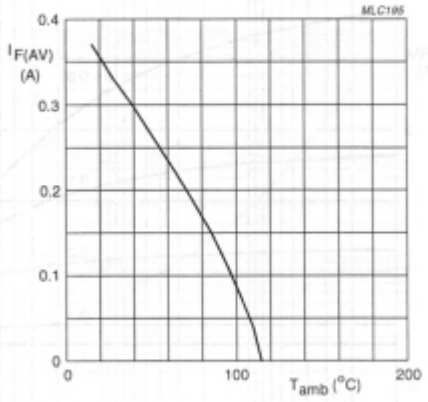
1. Device mounted on an epoxy-glass printed-circuit board, 1.5 mm thick; thickness of Cu-layer ≥40 µm, see Fig.11. For more information please refer to the *'General Part of Handbook SC01.'*

GRAPHICAL DATA



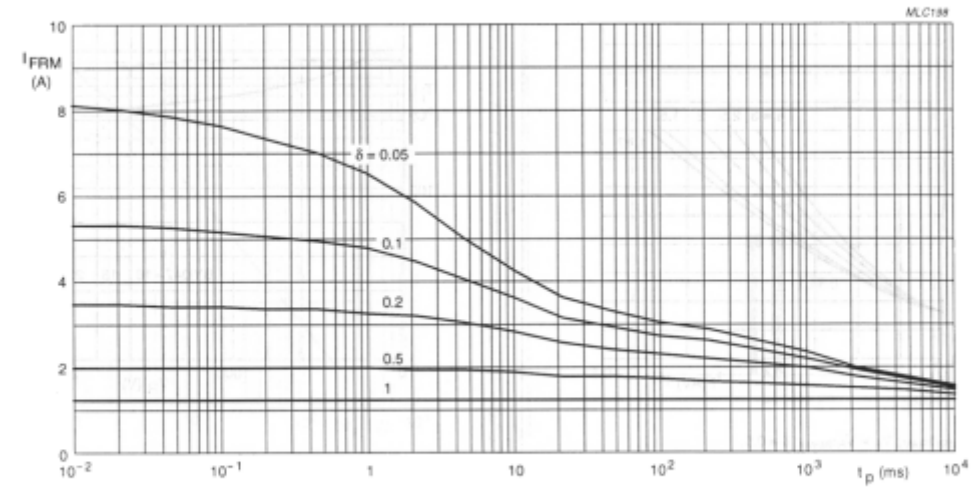
a = 1.42; $V_R = V_{RRMmax}$; $\delta = 0.5$.
Switched mode application.

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



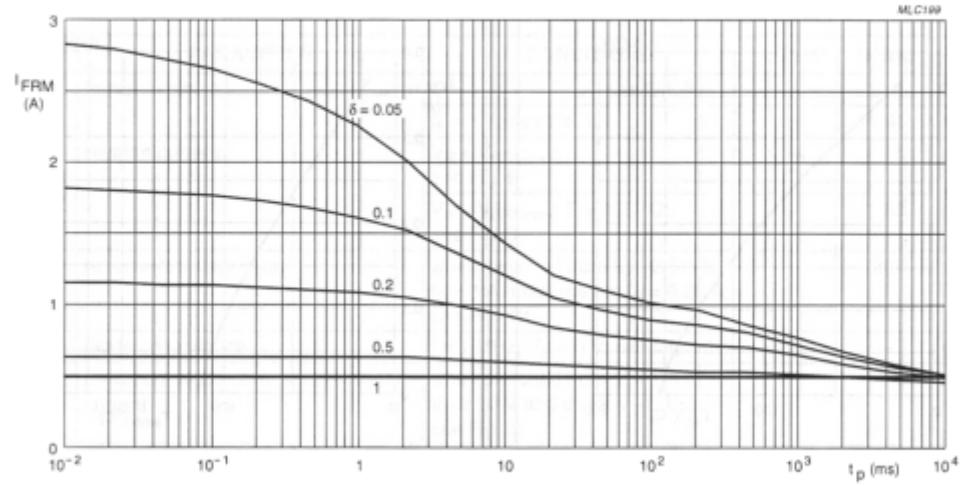
a = 1.42; $V_R = V_{RRMmax}$; $\delta = 0.5$.
Device mounted as shown in Fig.11.
Switched mode application.

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



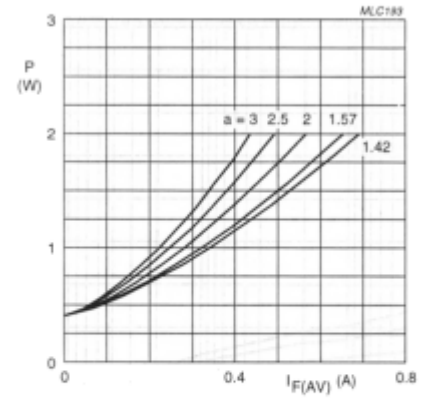
T_{tp} = 85 °C; $R_{th\ j\text{-}tp}$ = 30 K/W.
V_{RRMmax} during 1 – δ; curves include derating for $T_{j\ max}$ at V_{RRM} = 2000 V.

Fig.4 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.



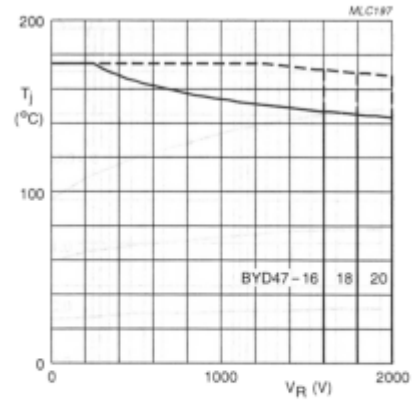
T_{amb} = 65 °C; $R_{th\,j\text{-}a}$ = 150 K/W.
V_{RRMmax} during 1 − δ; curves include derating for $T_{j\,max}$ at V_{RRM} = 2000 V.

Fig.5 Maximum repetitive peak forward current as a function of pulse time (square pulse) and duty factor.



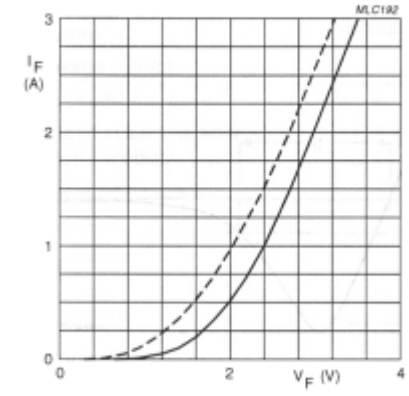
$a = I_{F(RMS)}/I_{F(AV)}$; $V_R = V_{RRMmax}$; δ = 0.5.

Fig.6 Maximum steady state power dissipation (forward plus leakage current losses, excluding switching losses) as a function of average forward current.



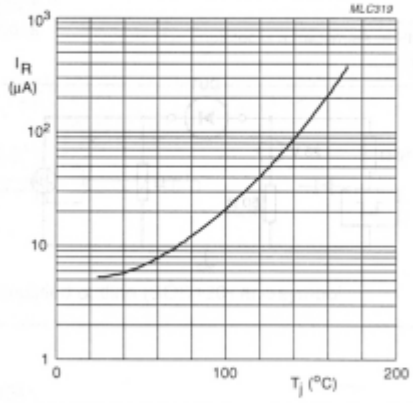
Solid line = V_{RRM}; δ = 0.5.
Dotted line = V_{RRM}; δ = 0.1.

Fig.7 Maximum permissible junction temperature as a function of reverse voltage.



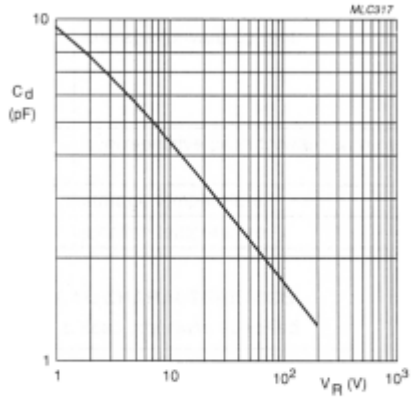
Dotted line: T_j = 175 °C.
Solid line: T_j = 25 °C.

Fig.8 Forward current as a function of forward voltage; maximum values.



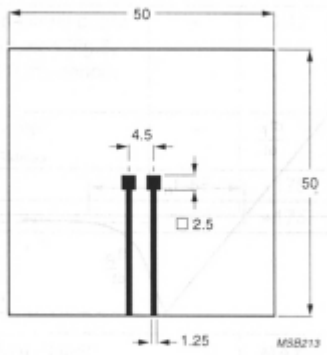
$V_R = V_{RRMmax}$.

Fig.9 Reverse current as a function of junction temperature; maximum values.



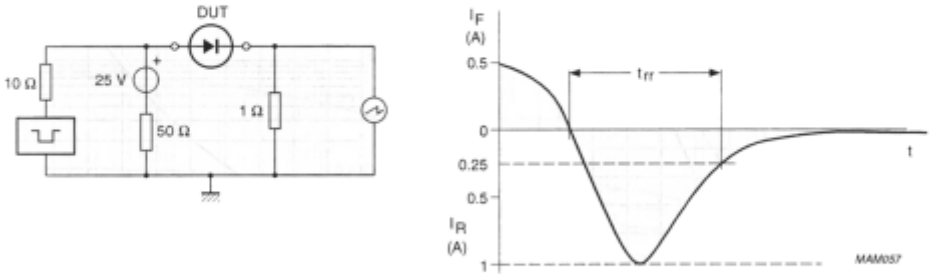
f = 1 MHz; T_j = 25 °C.

Fig.10 Diode capacitance as a function of reverse voltage; typical values.



Dimensions in mm.

Fig.11 Printed-circuit board for surface mounting.



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

Fig.12 Test circuit and reverse recovery time waveform and definition.

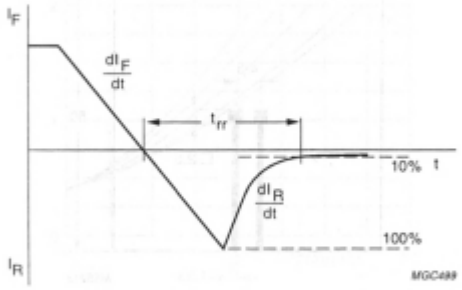


Fig.13 Reverse recovery definitions.